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the common process of puddling has been established by long usage, but it should not forget that its introduction also was beset with many difficulties. Referring to the inventions for using physic in the puddling furnace, Mr. Howson pointed out that their utility probably consists simply in this, that they assist in imparting that fluidity to the cinder, which is so essential in giving soundness to the hammered bloom. According to the instructions usually specified in these instructions, the proper time for adding the physic seems to be towards the end of the process, and there is good reason for this, because if it were applied early it would tend to scorch the fettling, whereas if applied late it unites at once with the cinder which is already melted, a greater part of which will be carried away by the revolving furnaces. It is a question whether the adoption of this method of working in revolving furnaces would not enable the excessive heat to be somewhat moderated. A few handfuls of sand thrown in just at the point when the iron is ready to ball up, always facilitates the shelling process, and tends to produce a solid bloom, without affecting the iron, so far as he is aware, injuriously. This view was confirmed by analyses made by Mr. Stead (of Pattinson and Stead) at the suggestion of Mr. Williams. A small quantity of Cleveland pig, accompanied with some coke, was poured in a liquid state into a hot crucible; a cover was then put on the crucible, and the whole was shaken up violently for a quarter of a minute. The metal contained—carbon 2·40; silicon, a trace; and phosphorus, 0·13 per cent. In No. 2 it consisted of 89 per cent. of mill tap, and 20 per cent. of sand, and the metal contained carbon, 3·00; silicon, a trace; and phosphorus, 0·04; showing that in eliminating the phosphorus, where the real difficulty lies, the best result was obtained where sand was present. It may here be noted that the wonderful short time in which this elimination was effected from pig containing not less than 1·25 per cent. of phosphorus confirms the fact, if confirmation were needed, that agitation, not less than heat, is an essential of effective puddling. Hence it is again a matter worth consideration whether more perfect mechanical agitation may not to some extent be a substitute for, and tend so far to moderate, the excessive and destructive heat. Machine puddling in the revolving furnace has during the last few years been on trial, and has had a hard struggle for the mastery to which it is still destined to attain.

Mr. HEAD said that exception had been taken to his observation at Leeds, that he thought the phosphorus in Cleveland pig had somewhat increased. Formerly good Cleveland forge pig did not run above 1·4 per cent. for phosphorus, whilst now it nearly had 1·7 per cent. One of the most remarkable things to him was that iron containing so much as even an average of 1·689 per cent. of phosphorus, or very nearly 1·8, should work well without complaint; but as far as he could see, unless there was any error in his calculations, he thought it seemed to be established that Cleveland iron sold by merchants as good brands did often contain 1·8 per cent. of phosphorus. He would say that if Mr. Bell still thought he was wrong he hoped he would show them in what particular. Referring to the conclusion of Mr. Kirk's paper, in which he stated that he believed phosphorus acted in the puddling-furnace in a similar way to silicon in scouring the fettling, he thought he had a little misunderstood him there. He (Mr. Head) did not mean to say that all he meant to say was that when forgemasters were afflicted with bad lots of pig-iron it was not always the silicon that was to be blamed, because, on analysis, they might find that the silicon was low in the pig-iron, but in the such cases they would find that the phosphorus was excessive. The evil he complained of was one which caused great loss to forgemasters, for not only did the pig-iron give a bad yield, but it had a bad effect on the bottom of the furnace. During the last six months much weak iron came in, and he had, therefore, had four samples of the bad working and three samples of well working iron analysed. He would give the figures of the silicon and phosphorus only, as these were the only materials that much differed. In the bad working pig the silicon found was 2·75, 1·925, 3·158, 2·286, giving an average of 2·461, or roughly 2·5 per cent., whilst the phosphorus was 1·67, 1·8, 1·727, and 2·28, giving an average of 1·869, or more than 1·8 per cent. In the well working pig the silicon found was—2·008, 1·520, and 0·914, giving an average of 1·48, or roughly 1·5 per cent., whilst the phosphorus was 1·668, 1·727, and 1·672, giving an average of 1·689, or something under 1·7 per cent. Therefore, in the phosphorus the difference was nearly 0·2 per cent. The analyses were made by Mr. Thompson, and as he at first thought that the difference might be from the mode of estimation, he had samples sent to Riley, and to Pattinson and Stead. The phosphorus was returned by Riley at 1·6, by Pattinson and Stead at 1·62, and by Thompson at 1·668, being practically the same.

Mr. BROGDEN enquired whether Mr. Head had estimated the sulphur at the same time? Mr. HEAD attributed the blame to the phosphorus, for they found in the bad pig—sulphur 0·248, and in the good 0·227, which was practically the same. Mr. RILEY would refer to the relation of silicon, carbon, and sulphur in pig-iron generally. He thought, before coming to any conclusion as to the analyses of Mr. Head had put before them, they ought to look at the relation between those three elements. They would always find that if they had a high percentage of carbon the sulphur and phosphorus went down. Mr. Bell started a theory some time ago that it makes little difference as to the normal impurities, but that it was merely a matter of temperature, and that by increasing the temperature in white iron he obtained grey iron. He was, of course, referring to iron free from manganese. Spiegelisen they sometimes found absolutely free from carbon, and they also found that as the silicon went up the carbon went down. He believed that in some cases the carbon was burnt out before they could get rid of the phosphorus, and it might be that in getting the phosphorus out of the Cleveland pig you burnt the nature out; but generally it did seem that simply keeping the carbon in the iron enables you to get the other deleterious ingredients out. He had shown with silicide of iron you could have 20 per cent. of silicon and no carbon. As to sulphur and carbon there is a similar effort, one to drive out the other. With excess of carbon and high temperature he got iron without sulphur, and he believed that in comparing the quality of pig-iron the carbon should be estimated.

Mr. BAKER, of Sheffield, said that as to the elimination of impurities he would mention some experiments which would be interesting. It was attempted to remove impurities in an atmosphere other than air. Starting from Schaffhausen's process he found that there was a difference in the elimination of impurities when clay and graphite pots were used. He operated upon the charges of 31 lbs. of iron, and passed chlorine through for an hour, and the loss was about 0·5 per cent. in the melting. In the graphite pot the elimination of phosphorus was from 0·8, and it was reduced to 0·3; with the clay pot there was no elimination of phosphorus, but the carbon was, of course, increased. He thus found that in the chlorine atmosphere phosphorus was eliminated, but not without the presence of carbon.

Mr. PERCY had brought down a lively specimen of a "bear" obtained in one of the furnaces of Mr. Attwood, with the analysis of it. After working the blast-furnace for a long period (of course, they all knew this) a mass of metal called the "bear" collected. In order to melt out this the hot blast was increased, and coke charged in with a small quantity of lime, no ore, and the portion of the metal melted ran out. The specimen was portion of that last run out, about 1 ton in weight. The interesting point about it was that it contained not less than 15·378 of silicon; that was the largest amount he had met with in any product of that nature, but the carbon was small, under 1 per cent., the figures being—carbon, 0·787; phosphorus, 1·13; manganese, 3·425; copper, 0·483; nickel and cobalt, traces, and a little lime, magnesia, and alumina. He was disposed to fancy that arsenic would be found more commonly in many of their iron ores than had been supposed. They knew little indeed about the effect of arsenic upon bar-iron. There were a very few facts recorded. He had brought down a specimen of a piece of Cumberland hematite supplied to him some years ago by Mr. Musket, which he had kept heated to redness for a long time in common charcoal, whereby that piece of ore had been reduced entirely, even to the cinder, to the metallic state, and being curious to see how it would work under the hammer he took it down to the Houses of Parliament, where they had a very accomplished smith, and asked him to forge a specimen, which he did, and to his astonishment the smell of arsenic was exceedingly strong, and filled the whole place directly. Then came the question whether it might not be desirable to investigate the presence of arsenic in ores of that nature, and he had no doubt there were many gentlemen there who were perfectly competent to undertake that task, and in the hope of inducing them to make enquiry on the subject he had ventured to trouble them with these few remarks. The whole subject was one which required careful working out.

Mr. RILEY had found arsenic in a sample of Cumberland hematite. He made steel from it, which when worked smelled distinctly of arsenic, the steel being very brittle and useless, and he must say that he had been lately engaged in examining that which should

contain arsenic, a series of blue billy or purple ore. He had very carefully examined it for arsenic, and in a very few samples could detect any appreciable quantity, though he had taken the most accurate means for determining it, and he must say that his experience would not lead him to suppose that they had arsenic in many of their ores, and he had tested them very carefully; and in regard to carbon in iron, iron seemed to have the property at a high temperature of dissolving far more than 4 per cent., and as it cooled it crystallised, and if it was cooled very slowly there were large plates of graphite between the crystals of iron, and he had seen analyses giving 7 per cent. of carbon, which was simply due to plates of graphite between the crystals and the iron, and formed no part of the iron whatever. He believed that about 4 per cent. was the maximum quantity of carbon that they could put into iron when there was no manganese present.

Mr. G. J. SNELUS said that when he mentioned at Leeds that the Commissioners' statement as to the Danks puddling was correct he referred to the weighings in at Cincinnati, not that the analyses were absolutely correct. In the limited time at their disposal it was impossible to do more than they had done, and he could only give the analyses of each class of pig-iron as nearly as they could get it from the samples they obtained. They could not weigh the squeezer cinder, and all their samples had to be analysed after their return from America and before the May meeting. It was impossible for him to know exactly the percentage of phosphorus in the pig-iron. He thought that now it would be better to expend time in getting fresh results than in investigating old ones.

Mr. J. A. JONES (of Middlesborough) would also justify the Commissioners' statement, and could not understand Mr. Kirk's statement respecting it; he thought his paper resolved itself into the question—Did they use more fettling per ton of iron produced than they accounted for? and pointed out that he had fallen into error in treating the Commissioners as stating that 18 cwt. 2 qrs. 25 lbs. cold pig-iron produced a ton of puddled bar, with 5½ cwt. of fettling. The Commissioners were instructed to enquire whether the furnace would puddle at all, and whether there was anything special in the quality of the iron used. This they did. As to more recent results, he would give them those obtained at the Erimus Works. The fuel used previously to June, 1874, was 27·65 cwt. per ton of puddled iron. From that date to November, 1875, the consumption was 18·30 cwt. per ton of bars rolled, and this was further reduced to 16·91 cwt. during the last month they were at work. In No. 10 furnace the fuel used was 13·90 cwt. per ton of bars rolled, and the fettling—12 cwt.—was subsequently reduced to 8·48 and 7·006 respectively. These figures showed that they were progressing. The wages were reduced to the extent of from 11s. to 10s. per ton of puddled bars. During the last month they worked 211 tons 18 cwt., and he still believed, from the experience he had had with it, that rotary puddling would be very successful. Of course, there were many difficulties yet to be overcome, but he was glad to know that Mr. Heath had been quite satisfied with the adoption of the rotary furnace, and that, so far as he was concerned, it had been a source of profit to him; and he thought also that the results of Hopkins, Gilkes, and Co. would show that rotary puddling could be looked upon as having improved very considerably in the last two or three years.

Mr. INNES HOPKINS stated] that the Danks furnace was satisfactory with regard to phosphorus, and he believed that in it the phosphorus could be almost entirely eliminated; after it leaves the furnace no phosphorus is eliminated. He should mention that much of the late improvement in the Danks was due to the men. They were now rendering their assistance to make it a success. They considered they had now gone beyond the range of experiment, and they knew they could now make as good a rail or as good a bar as by hand puddling. They were now, practically working, turning out 200 tons per week, or 4 tons per shift per furnace, and during the last few weeks with seven furnaces they made 290 tons per week.

Mr. W. FARNWORTH came to the assistance of iron as against soft steel. He believed that welding did not depend upon silica but on other reasons. He believed the grains of iron came into the other in the weld. As to the effect of arsenic he recollects meeting with an iron that worked well in the mill, but could be done nothing with in the blacksmith's shop, and upon enquiry he found that in the blast-furnace Irish bog ore rich in arsenic had been used.

Mr. MAYNARD had had some experience about 20 years ago at the works of Brydon and Sons, in the use of Champlain magnetite in the puddling furnace. These contained from 1½ to 1¾ per cent. of phosphoric acid. The ordinary working charge was 50 per cent. of magnetite and 50 per cent. of brown hematite, and the quantity of phosphorus was about the same in each. In the tap cinder there was about 4 per cent. of phosphorus, yet the iron is one of the best that goes into the market. The use of ore for fettling is not new, and in America hot-blast up to 40° is used in the puddling furnace.

Mr. PRICE considered iron in the puddled bar in a better condition for welding than at any subsequent point. The evidence furnished by Mr. Howson as to the cinder in the centre of the puddled bloom was not borne out by his experience. They found no advantage from frequent cutting, piling, and re-heating. After the first two pilings they found that piling promoted weakness, and welding was not to be depended upon.

Mr. CRAMPTON would like to see the merits of the rotary furnace ascertained, and also the effect of charges of different sizes. As to welding, he believed there was no weld that would give more than half the normal strength. He believed the iron must be made in large masses, and must be rolled in large blooms. He showed a common tube, one portion of which had been heated and quenched suddenly and turned over cold, and the other portion drawn cold and turned over. What he urged was that the Danks furnace would eliminate enough phosphorus to adapt the product for the manufacture of good iron. He believed that if iron was to compete with steel you must abandon the laminating process.

Mr. DEBY (Foreign Secretary) said that as this meeting had borne very much upon the manufacture of steel he might direct the attention of ironmasters to a cheap and unpatented process in use at the Hamoir works. It could be adapted to a blast-furnace for 30t., and would secure an increase of 1000 lbs. of metal per 24 hours.

Mr. KIRK, replying upon the whole discussion, said that Mr. Snelus had done a very good thing in putting the working into the form of a balance-sheet. The reason practical men did not take kindly to theories was just because they did not work out in practice, and if they could only get a theory which could stand a balance-sheet like that before them, and stand looking into, he thought practical men would accept it, and not cavil at it. Well, Mr. Snelus thought he had spent a great deal of time over his paper. Of course the report of the Commissioners was something better than anything he had seen before, and he did examine that very closely, and, as Mr. Snelus knew, his book was full of figures and calculations, which he had not troubled them with. He thought they only required the attention of scientific men and practical men together to get at the real science of puddling, and that had been the object of both his papers. Mr. Jones wanted to know how it was that he made it out that only 5½ cwt. of fettling was used to the ton. If he read his two papers he would have no difficulty in finding that out. He thought very great credit was due to Messrs. Hopkins for carrying on the Danks process in the way they had, and overcoming so many of the difficulties as they had. He thought they would have done it in less than a quarter of the time they had taken if a scientific investigation had been made first. There was one thing Mr. Hopkins mentioned, which was that when they re-heated the ball and the cinder in it the iron became quite crystalline. Now, he found in his experience an increase of phosphorus at that stage, and he thought it was worth their while, as scientific men, to enquire whether it was really an increase of phosphorus, or due to an extra percentage of cinder mixed with the iron.

The discussion on Mr. Simon's paper "On Chaudron's Method of Shaft Sinking through Water-bearing Strata without Pumping, and the Results obtained by it" was adjourned until the autumn meeting. An interesting paper "On Iron v. Wooden Cross-ties for Railroads," by Mr. J. L. Weyers, C.E., of Brussels, was submitted, and the illustrative specimens carefully examined, and some other formal matters having been disposed of the proceedings terminated.

Lectures on Practical Mining in Germany.

CLAUSTHAL MINING SCHOOL NOTES—No. XVIII.*

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SECTION II.

PROSPECTING FOR MINERALS—BORING.

II.—THE CONSIDERATION AND DESCRIPTION OF THE SEPARATE BORING TOOLS.

B—THE SHAFT RODS.—These may be either of iron or wood.

(A) IRON RODS.—The section of these rods is generally square, sometimes somewhat flattened at the corners (or eight sided), this is unnecessary, and costs more. Round rods may be used, but they are not so readily handled as square ones, and a square swelling must be forged at the lower part, so that a key can be made to hold it when unscrewing. Round ones are also dearer. The dimensions of the section are dependent on the depth of the bore hole and the mode of boring. In the case of rotatory boring, and a diameter of 3½ in. to 4 in., a section 1 in. square will suffice for a depth of 90 to 100 fms., although with this the limit of torsional elasticity is exceeded, and the rod may sometimes be twisted into a spiral form. With percussive boring without the use of a free falling apparatus (which should never be carried to a greater depth than 50 fathoms without), 1 in. square will be found sufficient; if the hole is carried any deeper the lower rods should be made 1½ in. in diameter. When a free falling apparatus is used, then up to a depth of 100 fms. a section ¾ in. or 1 in. square will be found amply sufficient. In one of the deep borings at Neusalzwerk, carried to a depth of 2220 ft., the upper 2130 ft. of rods were 1 in. square in section, and weighed 4½ lbs. per foot in length, the last 90 ft. was carried somewhat thicker in section, and weighed 17½ lbs. per foot of length. The extremes seem to vary between ¾ in. and 2 in.

The separate rods should be made as long as possible, which is limited by the height of the bore tower and the depth of the boring shaft, since the number of joints are diminished, which diminution increases the strength of the rod sets, lessens the cost, and the hindrance and stoppage of the boring. Beer gives the following scale—For rods 1 in. square a length of 12 ft. is desirable, for rods 1½ in. square a length of 15 ft., and for rods 1¾ in. square a length of 18 ft. At the deep borings near Schöningen the separate rods were 27 ft. in length, but were unscrewed three at a time (8 ft.), which was about the sum of the depth of the bore shaft plus the height of the bore tower. A greater length than 30 ft. is not advisable, as they are then inconveniently large for handling in the smithy. In many cases one will be limited by the length of the manufactured iron, and the difficulty in welding such long pieces together in the smithy. It is most advisable to make the rods of exactly the same length, since then the raising and unscrewing of the rods will take place much more quickly. Besides the chief rods, shorter lengthening rods are required, the length depending on the amount by which the chain or lengthening screw increases the length of the boring rods. Suppose the lengthening screw lengthens out 18 in., then we shall require rods 1 ft. 6 in., 3 ft., 4 ft. 6 in., 6 ft., 7 ft. 6 in., and 22 ft. 6 in., though we should find it advisable to have an extra rod 15 ft. long, so as to have fewer joints.

The junction of the separate rods is best effected by means of a screwed joint, this is decidedly the best method in the case of percussive boring. The connection is made by forming a screw on the top of one of the rods, which screws into a nut formed at the bottom of the next upper rod. The diameter of the screwed part should be a trifle greater than the side of the rod where it is square in section, that is, the cross section of the two should be pretty nearly the same. As an example—when the rod is 1 in. square the diameter of the screw should be 1¼ in., the length 2½ in., with 3 threads to the inch; at Schöningen the rods were 1 in. square, the diameter of the screw 1¾ in., the length 2 in., with 4½ threads to the inch.

Rooft gives, with a diameter of the screw of 1¾ in., a length of 3½ in., and 8 to 10 threads; with a diameter of 1½ in., a length of 2½ in., and 8 to 10 threads. It is advisable to make the screw somewhat tapering towards the end, and to cut the screw threads so that only some of them enter into the nut, the rod being screwed further down as the nut or screw are worn away, but it should never be screwed so far down that the two collars on the two separate rods touch each other, this would soon lead to a breakage of the screw.

The joint when completed thus forms an enlargement of the rod, about 2 to 2½ in. diameter, and 4 to 5 in. long, of which the first 1 in. and 1½ in. belongs to the upper rod, and the other 3 to 3½ in. to the lower rod. The swelling on the top of one of the single rods serves the purpose of a hold for any grapping instruments in case the rods break; this collar on the top part of the rods is sometimes placed as much as 6 or 9 in. below the screw, and when the rod is very long there may even be an extra one in the middle; the collar is sometimes square or six-sided, or even octagonal. An arrangement by Herr Kind has the top of the rod gradually enlarged as a square pyramid, and is rounded off at the upper part. A joint devised by M. Degoussé has the upper part of the screw forged smaller than the lower screwed part; this allows of the screw being guided and screwed more quickly into the nut, but the cost of such a joint is more than that of the others. It has been objected to the screwed joint that it only allows of the rods being turned in one direction, as if turned in the other direction the rods might unscrew, but this can readily be obviated either by passing a pin through the joint, or by filing or forging a flat on the joint, and passing a muffle to correspond over the joint, the muffle being wedged fast, or the outside of the joint might have left-handed screws cut upon it, over which a corresponding nut is screwed. The joint is sometimes effected by making a pyramidal end instead of the screw, which fits into a corresponding hole in the upper rod; the two are made fast by means of a cotter, or bolts; sometimes one of the ends is forked and made flat, the other end fitting between the fork, and being made fast with nuts and bolts. These have the objection that with the constant vibration to which they are subjected they are more likely to become loose and break, and that they occupy more space in the bore hole, so that in case anything fell into the holes the rods are more likely to become wedged fast.

Another method which has been proposed and used, but which does not appear to offer any greater security, and has the disadvantage of greater cost, is to forge a swelling on both ends of the rod, bore a hole in them, and tap them, and to have a single screw which passes to nearly half its depth in both rods; this, as well as the other joints just described, occasion a greater loss of time in fastening together and loosening than the simple nut and screw joints we have first described.

The making of the joint requires great attention on the part of the smith. The screw and nut are generally made first by themselves on account of the difficulty of handling the long rods in a smithy, and afterwards welded to the ends of a long rod. The swelling which forms the nut is best made by coiling a piece of flat iron several times round the end of a bar of iron 10 to 12 in. long, and then welding them together. By this means the threads of the nuts will fall approximately in the direction of the fibres of the piece of flat iron which has been coiled round. The screw has the collar forged on to it previous to cutting the threads; it is usual to make the screw out of hard iron, and the nut out of soft iron. The threads must be chased in a lathe, and all made to one template, so that the rods will fit at any depth at which they may be used; the threads are usually right handed. When the joint is finished it is numbered, the numbers counting upwards when the rods are in the bore hole, so that an invariable order may be kept, which is of importance in saving time. A complete set of rods, 1 square inch in section, weigh about 3 lbs. per foot of length; with rods 1½ in. square in section the weight is from 4½ to 5 lbs. per foot of length.

When boring without the use of a free falling apparatus the rods

* Being Notes on a Course of Lectures on Mining, delivered by Herr Bergrath Dr. von Groddeck, Director of the Royal Bergakademie, Clausthal, The Harz, North Germany.

must be made as straight as possible; in order to test the straightness of the rods they are laid upon the straightening bank; this is a long horizontal bank of wood, somewhat longer than the length of a set of rods, about 3 or 4 ft. broad, and 2½ ft. high, on which is marked a perfectly straight line. The bank is placed outside in the most convenient position for introducing the rods into the bore-house. The rods are straightened with hammers, being first slightly warmed for that purpose; the rods are tested by being brought close to the line on the straightening bank, and turned over on all four sides. Sometimes the rods are tested by being hung up side by side with a plummet line, but the method cannot be regarded as practical.

The rods are raised by means of the winding rope, and hang on a rack in order. Such a rack should be provided in every bore house, as the rods are liable to become bent when leant against the wall of the bore house, and besides saves much time when the rods are screwed or unscrewed, or being raised or lowered. The rack must be placed a little below the winding pulley, either in the scaffolding on which the men stand when screwing and unscrewing the rods, or from 2 to 2½ ft. above. The rack consists of a piece of flat iron 1 in. thick, laid horizontal, which has as many rectangular openings cut in it as there are sets of rods. The width of the openings is somewhat larger than the section of the rods, and the depth about double the width. In the bore tower at Brandeis the rack is made in the highest staging, and of wood. When the weight of the rods is considerable it will be well to cover the rack with iron plate cut to correspond. The lower end of the rods are held in position by a rack attached to one of the shaft timbers. This is made by driving strong nails, which have a ring for the head, into one of the cross beams in the shaft, a wire rod passing through the rings holds the lower ends of the rods in the rack. A rack arrangement used by Herr Kind has the rods suspended from a row of forks which are bolted to short vertical iron bars. These bars have at their upper end a hole, through which a round bar passes. Along this bar, which is fixed to the framework of the bore tower, the short vertical bars with the attached forks, and with them the rods, may be slid. By this means the rods can be brought directly over the bore hole when it is required to screw them on.

(B) *Wooden Boring Rods.*—Before the invention of the free falling apparatus, by deep borings breakages were of pretty frequent occurrence, especially at the joints, so that it was considered advisable to make the rods as long as possible, and to take care that they were light, and yet stiff enough for the borer, who had hold of the upper part of the rods, to perceive the smallest change which took place in the bore hole. As the bore holes were usually full of water, it was thought that by the use of wood the rods when immersed in water could be made as light as wished.

According to Herr Bruckmann wooden rods have been used in Russia so long as boring has been known, and according to Hericart de Thury wooden boring rods have been used in Germany since the 17th century. In 1833 Hofcrath Glencott used boring rods of wood at Bödingen, Germany; afterwards, in 1837, at Besch and Echternach, in Luxembourg, Herr Kind, who was previously in Glencott's service, and made use of the same material. The most suitable wood is pine, but larch (*Pinus larix*, on account of having no branches and the compactness of its fibres), oak, and even Scotch fir may also be used; the latter two, however, are seldom to be had clean and long, the trunk which is chosen must not have grown in the least spirally, and must be free from branches and faults. When a young larch or fir about 3 in. in diameter and 6 to 7 yards in length can be obtained they possess greater strength and torsional resistance than a piece of the same size cut from a larger tree.

In consequence of the diminished weight of wooden rods in water, the work in raising them is diminished, as also the velocity of the fall, and, consequently, the force of the blow. In any case a wooden rod soaked in water, or saline solution, is lighter than an iron one. At Schöningen the boring rods used were of wood, 2½ in. diameter and 40 ft. 6 in. long, and weighed, inclusive of the iron joints, &c., 143 lbs., or about 3½ lbs. per foot of length; when if iron rods 1 in. square in section had been used they would have weighed 4 lbs. per foot of length.

Since iron rods would be to a certain extent balanced, there is no saving in labour in the boring proper, but when the rods are to be raised or lowered the labour is considerably lessened, and the raising and lowering can take place much more quickly. In the deep borings at Schöningen, which we have already mentioned, the total depth of which was 2013 ft., the lowest 25 ft. of the boring rods, when made of wood, weighed 902 lbs. in air and 788 lbs. in water, the other 1984½ ft. weighed 7007 lbs. in air and 2047 lbs. in water; if made of iron the upper 1984½ ft. weighed 8076 lbs. in air and 7042 lbs. in water; so that the weight required to be raised when the rods were of wood amounted to 786 + 2047 = 2833 lbs.; when made of iron 786 + 7042 = 7829 lbs., or in the first case 135 lbs. per foot of length, and in the second case 39 lbs. per foot of length. According to the experience there obtained the saving of time in raising, when wooden rods were used, amounted to 56 per cent. The wooden rods occupied in raising 1½ hour, the iron ones 3½ hours; this is taken when raising the whole length, 2013 ft., nine men being employed in both cases.

In the borings at Cessingen Kind used pine, at Echternach oak; the wood used was cut into laths 2 in. square in section, but difficulty was experienced in obtaining straight grown wood, free from knots, &c., of lengths of 25 to 30 ft.; later, when boring at Besch, on the Moselle, he used again pine, 2 in. square in section, and 40 ft. long. It is not now usual to have the rods less than 2½ in. square in section. The joint of two rods is usually made by fixing a screw on to the top of the rod, and a nut on the bottom. The part of the joint attached to the lower end of the rod consists of a six-sided nut, which where it abuts the sheet iron cover by which it is attached to the wooden rod has a round collar; the part above is cylindrical, and fits into the sheet iron cover (likewise round), to which it is welded and made further fast by being pinned to the wooden rod with rivets and wedges. The attachment of the screw on the top of the next lower boring rod is made in exactly the same way—that is, the sheet iron cover is welded to the lower part of the screw, and made further fast with rivets, and to the wooden rod with wedges. The point requiring the most care in making the joint is the fastening of the sheet iron cover over the wooden rod. The sheet iron cover forms a conical tube, about 18 in. in length and ¼ in. thick, the narrower end being 2½ in. diameter, the wider 2¾ in. diameter; at the end, however, where it fits on to the cylindrical part of the nut or screw, it remains perfectly cylindrical, so that it can be welded and riveted on. In making the sheet iron cover care should be taken to have the fibres in the direction of the length of the rods, and the long weld must be carefully made; this welding can, however, only take place at the two ends of the cover, the middle portion being riveted, the rivets must be somewhat sunken. Before the cover and the nut or screw are riveted to each other, the cover must be passed over the wooden rod and made fast to it; for this purpose the end of the rod is smeared over with oil or tallow, and the narrower end of the cover being more readily driven on to the wooden rod. Before doing this the cover is warmed somewhat, so that on cooling it shrinks tight on the rod. The cover is driven on only so far that the rod reaches the commencement of the cylindrical part. In order to make the joint additionally secure it is wedged; for this purpose a round hole is made in the middle of the end of the rod, into which a wedge of dry beechwood, 12 to 15 in. long, and 1 to 1½ in. wide at the top, is driven; after that a round iron wedge of the same length, and from 2 to 1 in. wide at the top, and lastly one or two shorter ones, about 7 to 9 in. long, and ½ in. wide at the top, are driven in.

After the cover and rod are thus made sufficiently fast the nut or screw is forged on to the cylindrical part of the cover, and is made still faster by inserting three or four rivets. This joint which we have just described is attributed to Von Seckendorf. Kind's arrangement has on both ends of the rod a nut similar to that on the lower end of the rod in Von Seckendorf's arrangement. Between the two is a short metal piece of iron, which has a screw on both ends. Kittinger has simplified the arrangement of Kind—the nut and cover are first forged in one piece, which is drilled through and then tapped. After the cover has been driven some distance on the rod by hand, the middle piece is screwed into the nut; the rod which

is suspended is laid hold of by four men, and the end of the middle piece is driven against a block fixed firmly in the ground. When the end of the wooden rod comes against the nut inside the cover, the middle piece is unscrewed, and an oaken wedge is driven tight in. The projecting piece of the wedge which fills the nut is bored out with a flat auger; the middle piece has a collar forged upon it by which the rods are suspended above the bore-guiding tube. When two rods are to be unscrewed an ordinary key is passed over the middle piece above the collar. The rod is embraced at the cover by a key, or rather clamp, so that a set screw, inserted through the clamp, passes into a depression in the cover, which prevents its slipping round. The rods were 30 ft. long, and weighed, including the middle piece, 55 lbs. in air, and only 12 lbs. in water, and were made of young pine or oak, and not cut from a large tree.

A later construction of the joint of wooden rods devised by Kind has the nut and screw similar to the arrangement we have previously described as used by Kind for iron rods; the part where they are attached to the rods being prolonged to a length of from 30 to 36 in. in a forked manner, both sides, however, being dished to embrace the wooden rods; they may, however, be made rectangular to suit the section of the rod. Over this three or more rings are shrunk on and nailed.

The advantages of using wooden rods are chiefly in very deep borings, and always under the supposition that a free falling apparatus is used, and that the bore-hole is full of water. With the use of Fabian's free-falling apparatus, however, iron rods are to be preferred, since on account of the torsion of the wooden fibres the twist given by the borer at the surface is only transplanted to a certain depth unless the work of the borer (in giving the twist required) is to become very exhausting. The wooden rods have also the disadvantage that when left out of use for a long time their durability is affected, so that when boring is not taking place it is better to allow the boring-rods to remain suspended in the bore-hole under water than to leave them to hang dry on the rack in the bore-house; this appears more especially necessary in winter, for when the wet rods are raised and left to hang in the bore-house or in the open air, the water freezing in the pores of the wood cracks it, making long rents, which gradually widen and loosen the joints. The keys are sometimes made single, and at other times double. One of the most common shapes is that of an L, which can be either single or double. The L key is sometimes made to open out slightly instead of remaining parallel, so that the key may be passed over the rods more quickly, and also that it may fit, notwithstanding any slight changes in the dimensions of the rod, due to forging, &c.

Another common form consists of a round bar of iron with a flat piece in the centre, the flat piece having a slit in it fitting the section of the rods, the slit running approximately in the direction of the length of the key. This form is that generally used at the bottom of the bore shaft, and is made somewhat stronger, as it is sometimes used to suspend the rods by being placed across the mouth of the guiding bore tube, and immediately below one of the collars forged on the rods for that purpose. The double keys are seldom used with free falling borers, as the dimensions of the rods are smaller, and such long handles are not required.

Rods formed from Hollow Iron Tubes.—In order to diminish the weight of the boring rods, and keep them at the same time stiff, Degoussé patented, in 1841, the application of rods formed from hollow iron tubes. The first was used by Von Oeynhausen, in 1845, at the deep borings at Neusalzwerk, the total depth of which was 1900 ft. For this purpose he used rolled iron tubes 1½ in. inside diameter, and 1-6 in. thick, 14 ft. 1 in. long, of which two were joined together, forming a rod 30 ft. long. To the bottom of the tube rod having a nut at its lower end is attached, and to the top a rod having a screw at its upper end. A collar is forged on to the short rod a little below the screw. The rod which has the screw (about 2½ ft. long) is first brought to a welding heat and driven into the end of the (cold) tube. Care must be taken not to force open the longitudinal weld of the tube. After this, the middle rod upon which the two tubes are welded is in like manner inserted. Such a rod weighs 110 lbs., whilst a massive iron rod for the same purpose would weigh 149 lbs. In order to make the connection between the short rod and the tube more secure two holes are bored at right angles to each other and rivets inserted.

In our next number we shall commence the discussion of free falling borers, a subject which has received a great amount of attention, and which has been brought to a considerable degree of perfection on the Continent.

UNDERGROUND FIRES IN COAL MINES.

At the Manchester Geological Society, on Tuesday, Mr. W. J. GRIMSHAW, of the Stand Lane and Whitfield Collieries, Radcliffe, read a paper "On Underground Fires in Coal Mines," in the course of which he said that great effects were often produced by small causes, and from that point of view fires occurring above ground or below ground were much on a par. An unforeseen occurrence, or careless act, which caused a fire above ground might in a similar manner cause a fire below ground; but, as regarded after results, all similitude ceased. As instances, he might mention that fires of more or less magnitude had come under his notice resulting from the following causes:—1. Ignition of canvas air tubing from a small feeder of gas which had been lighted by a shot, and where the men had left the place and given no alarm for some time afterwards. In this case the fire gained great headway, and after several violent explosions the pits were sealed. On re-opening, about two months afterwards, a violent explosion occurred, and the fire was eventually subdued by flooding the pits.—2. Shots fired at the end of a shift and the places not examined for some time afterwards.—3. A torch-lamp falling into an open grease-box near the pit bottom.—4. Furnace ashes filled into a tub without being properly slackened.—5. A shot bringing coal down solid, and igniting the gas in the break behind.—6. Soot clogged on curbs and sides of a furnace-pit, by accidental influx of water, and ignited two days afterwards.—7. Backing on arching igniting spontaneously.—8. Mouthing 14 yards above the furnace catching fire from the furnace.—9. Timber behind the pitting opposite the furnace ignited from the furnace.—10. Spontaneous combustion and burning through, or displacement of, rib or barrier left to cut off a gob fire. In the course of conversation with Mr. J. S. Martens on this subject Mr. Grimshaw said that gentleman had mentioned the occurrence of two fires at the Hibernia Colliery, Westphalia, one of which was caused by the ignition of a small quantity of gas in an old road, and the flame withdrawing behind a pack, burned so long as to ignite some old timber which had been stored there. The other was caused by a torch lamp placed behind a prop to shade it from the air, and thus igniting the timber. This occurred in a main return airway, through which steam pipes were carried, and the fire extended a distance of about 140 yards in less than six hours. The above tabulation of a few of the causes of underground fires might give some idea of the difficulty of taking any other than general precautions to guard against their recurrence. Comparatively speaking, a fire on the surface came to a definite end in a reasonably definite time, the progress thereof might be marked without risk, and the best means of dealing with it were generally obvious. Many causes, however, conspire to render the extinction of an underground fire a much more arduous and dangerous undertaking, whatever means of dealing with it might be adopted. Broadly speaking, but four courses were open for choice—following the fire up, and extinguishing it with water; flooding the mine, wholly or partially; sealing the shafts, the workings, or part of the same; or filling the mine with carbonic acid. As regarded the first-mentioned course, an interesting paper was read before the Society by John Knowles, Esq., detailing the process as applied to a fire at the Pendlebury Colliery, which was eventually extinguished by this means. Proverbial wisdom said that delays are dangerous, and in no case was the maxim more frequently true than in relation to the dealing with fires occurring in collieries. An hour of active measures at the commencement was often very much more valuable than months would afterwards be, and in addition he believed that generally the earlier a fire was dealt with the safer it was for those engaged in the operations. Following up a fire with water was certainly

most satisfactory method of dealing with it; the progress that was being made was known; there was greater scope for the exercise of judgment, and greater sense of security than there was for those employed in bricking off a fire; in fact, the difference between the two methods might be likened to the difference between fighting a duel in the open air and in a dark room. Another strong reason in favour of following up a fire with water was that when the fire was short time. The fire was done with, and the great expense of keeping the pit idle for an uncertain period saved. Yet although he considered this method of battling the fire best he did not mean to assert that it ought to, or even could, be tried in all cases. The varying condition of mines, and the constantly varying condition of any fire whenever it occurred by any special means. Consequently very much depended on individual effort called into action by emergency. It had been said that the "unexpected" always happened; but, unfortunately, few people were gifted with the power of defining the unexpected. Even when means of dealing with a fire were immediately at hand it did not always seem that success was achieved. Mr. Grimshaw then gave an account of a fire which occurred at the Drummond Colliery, Nova Scotia, in 1873, and stated that although water was stored near the seat of the fire, and great efforts were made to extinguish it, the pit had eventually to be flooded. The reader of the paper next proceeded to deal with the third method of extinguishing underground fires—by sealing up the shafts and workings, so as to deprive the fire of the air necessary to support combustion, and gave a detailed account of a fire which was dealt with in this manner. After some remarks on gob fires and the effects of concussion in extinguishing flames, Mr. Grimshaw said sometimes a fire occurred which it was impossible to approach sufficiently near to reach with water. Occasionally it was impossible to ascertain the exact locality of the fire. Two courses were open, one being the flooding of the mine, and the other the stopping of the ingress of air. The first method was objectionable if the workings were situated on the rise of the shafts, and had no level communication therewith from their highest point. In a case that came under his notice the mine was flooded to extinguish a fire on the rise. The water was allowed to rise in the shafts to a point considerably above the highest portion of the rise workings. The water remained in some weeks, but on re-entering the mine the fire was found burning, the water not having reached it. The air had been compressed to such an extent as to raise the weight of water, and whilst it rose in the shaft prevented it rising in the workings. Flooding also greatly damaged the workings, in some cases literally ruined them. Sulphur was next mentioned as an agent which might be useful in some cases; and with regard to the operation generally in extinguishing underground fires, Mr. Grimshaw said that no more men should be in the pit than was strictly necessary. In conclusion, he said that whatever precautions might be taken, fires would still occur. The chief necessity was promptitude in dealing with them when they did occur. A mine was not like a workshop, where the workmen might be seen at a glance, but was rather a collection of workings united with each other by a band of common safety or common danger, and requiring prompt and intelligent action when the danger arose.

A vote of thanks having, on the motion of Mr. SMETHURST, seconded by Mr. CHADWICK been passed to Mr. Grimshaw for his paper, a short discussion arose upon the matter dealt with. Mr. DICKINSON said he had had to do with a great many colliery fires, and the paper which had been read was a very practical one, and one which would bear reading. With regard to sulphur and carbonic acid gas, he had seen an attempt made by this means to extinguish a fire at the Great Lever Colliery 25 years ago, and when they opened the colliery some months after the coal was still burning. So far as he had observed, carbonic acid gas was rather injurious than otherwise, the current which was caused by it having a tendency to promote combustion.

Mr. GRIMSHAW thought in the case which Mr. Dickinson had referred to it was not actually carbonic acid gas, but there was with it a large quantity of air, eight or ten times as much. If chemists could discover some means of taking the carbonic acid into the mine solid, so that it could be used just at the place where it was wanted, it would be very useful.

Mr. DICKINSON said that in closing mines he always preferred to shut up the return air course as well as the intake.

Mr. THOMPSON did not think from his own experience that much value was to be attached to the readings of a thermometer put down into the mine after it had been closed. In a case of his own the results obtained were not worth the trouble of taking.

Mr. DICKINSON said some judgment could be gained from the peculiar smell of the gases emitted from the mine.

Mr. SMETHURST said carbonic acid might do very well where the mine was not thick, but where the coal was 16 ft. thick it would require a tremendous amount of gas to put the fire out. It was also very difficult to shut out the air, and the only really effectual means, in his opinion, was to put in water. He was at Messrs. Pearson and Knowles' pits when they were on fire. They were shut up, as it was thought, effectually, but immediately they were re-opened another explosion took place, two firemen were killed, and then the pit had to be flooded.

Mr. THOMPSON observed that very often water was not obtainable for putting out a fire.

After some further discussion, in which members agreed with Mr. Dickinson that in closing a mine both the intake and return air-course ought to be stopped, the proceedings terminated.

UNITING IRON AND STEEL.—It is well known that in employing either steel or iron for various purposes of manufacture the result desired is frequently only partially attained—as, for instance, tools and other articles made entirely of steel, though possessing great hardness, do not combine therewith the requisite degree of tenacity, while articles made entirely of iron, though possessing great tenacity, are completely wanting in the necessary hardness and elasticity. These inconveniences can only be removed when both steel and iron are so intimately combined as to form a perfect union, whereby the deficiencies existing in either metal are atoned for by the qualities of the other. For this purpose Messrs. ASBECK, OSTHANS, EICKEN, of Hagen, Westphalia, manufacture a mass consisting partly of steel and partly of iron, and which they call steel-iron. The novelty, if any, consists in introducing a thin plate of iron at the junction. A chill of cast-iron is divided into two compartments, either by a transverse plate, or by standing a tube within it, and the metals to be united are poured into the separate compartments. Previous to fusion both metals are refined and purified from all substances pernicious to their welding, after which the steel is fused, as also the soft iron in fusion, are at the same time and in similar proportion cast into the divided chill, the dividing plate of sheet-iron in which welds both the steel and iron so intimately together that they form a perfect union, the sheet-iron serving at the same time not only as a preservative against the compounding of the two metals, but also as a means of their welding. The success of the proceeding depends greatly upon the careful and peculiar preparation of the materials, and upon their quality and fitness for welding, as also upon the thickness of the sheet-iron plate, which must be sufficiently thick to resist the burning influences of the metals in fusion, and yet not too thick, otherwise the materials in fusion during their rising in the chill will not bring the plate to welding. The requisite thickness of the sheet-iron is determined by experience, and the dimensions differ naturally in proportion to the transverse cut of the different blocks to be made. The steel and iron are placed on one or other of the dividing sheet or tube, according to the purposes for which the mass is required. The combination is said to be applicable to various purposes; it is explained, for instance, that it will be advantageous to employ steel-iron for rails, anvils, and armour-plates, as the hard steel will diminish the wearing, and armour-plates for safes, to render them burglar-proof, when made of this improved material will, owing to the steel therein, resist the hardest drill, while at the same time the iron preserves such plates from all danger of fracture from blows. All such

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parts of machinery or tools as have either to resist or to produce a strong pressure or strong concussion, such as rollers or axles, are greatly superior when made of this improved material, which combines great internal tenacity with external hardness. The wear of the external material is reduced to a minimum, whilst its internal softness gives it considerable tenacity, and prevents breaking.

SOLID EMERY WHEELS.

Although, when first introduced, workmen had much prejudice against emery wheels, they have long since ascertained that their prejudice was misplaced, and emery grinding is now in great favour, especially with piece hands, so it is not surprising that at the recent meeting of the Iron and Steel Institute a large amount of interest was taken in the solid emery wheels exhibited by Messrs. A. H. BATEMAN and Co., of East Greenwich, who enjoy a very high reputation for the excellence of their manufactures. The opinion is very general that this kind of wheel will at no distant date entirely displace the grindstone, as equal advantage in every respect is secured with a smaller sized wheel, which can be easily and quickly mounted, and is very durable. Their great strength enables them to be run at high speeds, and the angular mineral grains of which they are composed being inferior to the diamond, this is, indeed, no more than would reasonably be expected, when it is considered that grindstones are of very uneven texture, and mainly composed of water-washed and rounded particles of silica. While the stones have to be roughed and picked from time to time, no really good emery wheel ever requires such treatment, presenting always a fresh, free, sharp cutting surface. Owing to this surface, and the very high speed, the work needs to be lightly touched to the wheel, and the selection of heavy men as grinders is done away with, as are also the swinging boards and housings, and appliances for getting pressure. Owing to the moderate size of the wheels, they can readily turn with diamond tools, and thus always revolve as perfect circles instead of becoming eccentric, and thus presenting a surface upon which good and accurate work is practically impossible, however much care the workman may employ.

With regard to the use of solid wheels it has been very truly re-

marked that they are not intended to displace the buff wheels of wool and leather. They may do some of the ordinary glazing, but where a high finish is required the buff wheel has the advantage, owing to the fact that it yields under pressure. The solid emery wheel is a disadvantage, however, as a means of quickly and rapidly preparing the metal for the fine glazing buff wheel. But the best field of all for the solid wheel is on the vice bench, and an excellent authority upon such subjects points out that a wheel so perfectly turned that the work can be kept in continuous contact with it and run at the proper speed, does work in one minute equivalent to that which would be produced if a file a mile long was passed over it in the same time. The probable average speed of filing is about 60 ft. a minute, while the wheel has a surface speed of 550 ft. Almost every piece that needs filing has to be clamped and re-clamped in the vice several times. Now, as a rule the wheel will perfectly finish the work in the time which would ordinarily be occupied in clamping and unclamping in the vice. Here is thus a clear gain of all the time now spent in filing, whilst the facility for manipulation is such that any man who can handle the file properly against his work can still more easily handle his work on the wheel, for the demand on his strength being lessened his whole skill can be employed in guiding the piece to be ground. Machines of large size are furnished for heavy work, and the largest engine builders can use them to advantage. Even they can use moderate sizes for the fitting of keys, &c. But manifestly it is in such factories as employ vices by scores and hundreds that the solid emery wheels can be best applied. One grinding machine can safely be introduced by every manufacturer for each pair of vices now used. The great profit to be derived from the general introduction of solid wheels is in the saving of wages. The next is in the saving in files, and the next in the increase in the daily product and its improved quality.

Corundum is well known as the base of the ruby, sapphire, and similar gems, and emery is this corundum with a slight admixture of oxide of iron, the chief source of supply being Greece and Turkey. The lump mineral as it is obtained from the mines and comes into the market is reduced to powder. The individual grains thus obtained are sorted into sizes by sifting through sieves varying from 8 to 100 linear meshes to the inch, and if examined microscopically are found (unlike so called sharp sand and other similar materials) to be one mass of sharp angles and points. These points do not wear smooth with friction, but present a constant succession of fresh cutting surface. For several years attempts were made to agglomerate these grains into a homogeneous mass with resinous and glutinous substances, but all possessed defects either in strength or in glazing by friction against the work. Indeed, it was not until the introduction of the invention by which the wheels supplied by Messrs. Bateman and Co. are produced that anything approaching a perfect wheel was brought into the market. In these wheels the cementing material is an insoluble silicate approaching flint in hardness, and which by a curious chemical process is formed within the substance of the block or wheel, there being no known means of effecting its direct use. This cementing material is so strong that if a block of emery composition made with it be broken it will be found to have fractured through the grains of emery, and not by pulling them out of their matrix. It is so hard as to cut well in itself, and yet sufficiently softer than emery to wear away faster, and thus avoid the glazing that would otherwise inevitably accrue.

This cement being insoluble in water enables blocks prepared with it to be used either wet or dry, although the latter way is in most cases preferable. Small blocks of consolidated emery may be used with great advantage by hand, but a perfectly marvellous result is obtained when the form of a circular disc is adopted, and the same rotated at a high speed. Under these conditions the durability and cutting powers of the material are simply extraordinary, experience having proved that minutes with the wheel will do the work of hours with the file or chisel. The Bateman wheels are a modification of an American pattern, and, although as with all emery wheels a certain amount of judgment is necessary in order to obtain the best results, the experience of large ironworks have shown that they are capable of generally taking the place of the file and vice, that they are thoroughly well designed, and very handy and economic in use.

CENTRAL FOXDALE SILVER LEAD MINING COMPANY—
SPECIAL REPORT.

March 23.—The 105 west is being driven by the side of the lode, which will be cut into when drained. The 105 east is also being driven by the side of the lode, a portion of which has been taken down close to the end, and which contains ore, but the value of the lode at this point cannot be stated, as is not cut through. It is shown, however, that the ore recently discovered in this end extends further, and is an important indication for deeper levels. The lode in the 90, east of engine-shaft, is very large, only a portion of which is being carried with the end, which portion yields good stones of ore. No. 1 pitch over the 90, on the caunter lode, yields about 1 ton of ore to the fathom. No. 2 pitch, over the 90, yields about $\frac{1}{2}$ ton to the fathom. No. 1 pitch, over the 75, on caunter lode, east of engine-shaft, yields 8 cwt. of ore per fathom. No. 1 pitch, below the 60, east of engine-shaft, and on caunter lode, yields 6 cwt. per fathom. No. 1 pitch, over the 60, east of engine-shaft, on the north lode, yields 5 cwt. of ore per fathom. The lode in the 60, east of engine-shaft, on the north part of the north lode, yields saving work. No. 1 pitch, at the 10, at Taylor's, yields 6 cwt. of ore to the fathom. The lode in the 47, west of Taylor's, on the north lode, does not yield mineral to value at present. The immediate object of driving this level at present is to effect a communication to the 60, east of engine-shaft, and thereby allow the water at Taylor's to flow back to the 60 engine shaft to the pole fixed there. In addition to this, and what is of vital importance, to hole Taylor's to the workings connected to the engine-shaft, and thereby establish proper ventilation throughout both parts of the mine, which is absolutely needful. The 75 cross-cut, south of Taylor's, has, it is computed, about 5 or 6 fms. further to be driven to intersect the south lode. This cross-cut, which is now about 6 fms. from the shaft, has gone through a counter lode, containing stones of ore, and has also intersected several small veins of ore in the country, which are probably drawn from the lode ahead. The importance of cutting a profitable lode in this cross-cut will be readily seen, and a point of great consequence will come off here shortly. Pending the communication of the engine-shaft workings to Taylor's, it has been found needful to effect artificial ventilation by means of large pipes. This has been carried into effect from surface to the bottom of the mine, and meets the purpose. The pump engines being overloaded by means of serving three sumps, it is found needful,

in order to proceed with the sinking of the engine shaft, which I consider should be done with all dispatch, to lighten its load by cutting off one of the flat rod sumps. Amy's has in consequence been detached, and the operations in that part of the mine are, therefore, standing in abeyance. A change has within the past two months been introduced in the mode of working the mine, which has even already a beneficial result by creating the raising of ore in tangible quantity. At the end of next week I estimate we shall have dressed and undressed ore to the extent of about 67 tons. About 47 tons of this quantity is already dressed for the market, and we shall, all well, be daily adding thereto. Relative to future returns, I believe I am safe in stating that they are likely to continue and increase, provided the mine is opened out in the right manner, on which much depends. The conclusion I consider the property justifies me in coming to relative to its merits are the following—1. The present prospects are of a decidedly encouraging nature. 2. That much of the success of the mine will depend on the amount of energy and skill brought to bear on the general and detail operations. 3. That with the right management the mine stands an excellent chance of becoming permanently remunerative. —GEORGE RICKARD.

GREAT FOXDALE SILVER-LEAD MINING COMPANY—
SPECIAL REPORT.

March 24.—The lode in the 83, east of engine-shaft, has become disordered and split up into branches in the present end. No. 1 pitch over the 83, east of engine-shaft, yields $\frac{1}{2}$ ton of ore per fm. No. 1 pitch below the 68 yields 8 cwt. of ore to the fathom. No. 1 pitch over the 68 yields $\frac{1}{2}$ ton of ore to the fathom. The holing of the eastern shaft from the surface to the 14, will have been effected all well in about four weeks. This will complete a thorough ventilation throughout the whole workings, and will be a vital point gained, as the lack of air greatly impedes operations underground at present. The quantity of ore that will be in hand, dressed and undressed, by the end of the next week—the end of March working month—will be about 34 tons. About 28 tons of this quantity is already dressed for the market. Relative to the general state of the prospects of the mine for making returns of ore I think it necessary to remark that although the average yield per fathom of the lode is not large, yet on account of the inexpensive nature of the ground to stope when laid open, lodes of the above value will leave a good margin of profit, the scope of unworked ground being very large. A judicious extension of operations, and on the side or caunter lode or lodes, is likely to result in greatly increased returns. Very little has been done on the caunter lode driven on in the 49. This lode appears to present indications that cause me to think it may be more valuable than has been supposed, and that more should be seen of it. The conclusions I consider I am justified in coming to relative to the present prospects of the mine are the following—1. The prosecution of operations on the caunter lode and other promising points is likely to be attended with favourable results. 2. That inasmuch as the mine can be inexpensively worked, comparatively, and the present returns of ore being already sufficient to greatly neutralise the cost, there is a fair chance, with skill and proper management, of the concern being made to answer.—GEORGE RICKARD.

FOREIGN MINING AND METALLURGY.

Some astonishment has been excited at Paris in consequence of comparatively few orders having been received for iron for construction purposes, although operations in the building trade have been resumed with activity. Re-assortments are being made regularly and quietly, so that prices are maintained without sensible variations. In the various centres of production the situation has scarcely changed; the present state of affairs is by no means completely satisfactory. Pig remains at a low price, especially pig for refining. Quotations present no great importance, in consequence of their little firmness; we may, nevertheless, note the fact that in the Meurthe et Moselle, the Haute-Marne, and the Nord a quotation of 62. 16s. per ton has become general for ordinary descriptions of iron. It was recently reported that a very heavy order for armaments was pending between the Italian Government and M.M. Schneider, of the Creusot Works; the importance of this affair has, however, been considerably exaggerated. A large extent of new railway is under consideration in France, but until its construction has been finally determined on by the French Legislature French metallurgical industry will, probably, remain in a rather languishing state.

For a long time past sales of coal have been much reduced in Belgium, but notwithstanding this they are experiencing a further contraction apparently from day to day. The only serious purchases at present appear to be those made by the proprietors of brickyards. Coal for industrial purposes has presented no symptoms of a revival, metallurgical industry continuing in a precarious condition. Quotations present no firmness, production being much in excess of a greatly reduced consumption. In March, 1876, complaints were rife similar to those which are now heard. Since then the aspect of industrial affairs has become, if possible, still worse. There has been scarcely any winter, and domestic qualities of coal have not sold in consequence at all readily; and further, the Belgian Government has not announced for 1877 any contract for coal on account of the Belgian State Railways. Belgian coalowners cannot, of course, regard this state of affairs without apprehension, but the only thing which they can do is to wait.

Stocks of coal appear to have been slightly reduced in France; this is due to the resumption of navigations, which has enabled deliveries to be made more freely, although it is not at all clear that more sales have been effected. As regards prices, they have exhibited no variation; certainly they are not higher or firmer. Some hopes were based on the sugar campaign, but at present the results obtained have presented no very special cause for rejoicing on this head. Business has, in fact, been paralysed by a reciprocal distrust. Buyers have only purchased from day to day, while sellers have been ready to make serious sacrifices in order to obtain large contracts. These observations apply more particularly to the markets of the Nord and the Pas-de-Calais, but the Paris market has not been in a better state; there have been increased supplies, and it is feared that if the present depression continues they will not be disposed of before the next season. The coal market of the Loire basin is in a rather better state; the deliveries are sensibly increasing, and the internal consumption is increasing also, as the metallurgical interest in this part of France is not without employment.

The slight increase of activity which has been recently noticed in the Belgian iron trade appears to have been maintained; at the same time, prices do not revive, and the competition prevails. In a recent sitting of the Belgian Chamber of Representatives the Belgian Minister of Public Works announced that an order for 800 trucks was about to be given out for the Belgian State Railways. It was stated recently that the Champagne Forges Company was rolling a special iron for the manufacture of bolts; the process is now said, however, to be not a new one, having been patented by M. Nicase in February, 1859. It appears that the value of the mineral production of Austria in 1875 amounted to 4,284,500/-, or 343,300/- less than the corresponding value for 1874. Coal was represented in the general production of 1875 by 4,549,000 tons, or 78,000 tons more than in 1874. Ironstone figured in the production of 1875 for 705,000 tons, or 210,000 tons less than in 1874. The value of the coal raised in 1875 in Austria was 1,792,800/- of the lignites, 1,542,400/-, and of the ironstone, 273,500/- The value of the production of the metallurgical industry of Austria in 1875 amounted to 2,516,600/- Iron furnished 262,000 tons, or 28,000 tons less than in 1874. An adjudication for 6750 tons of Bessemer steel rails for the Berlin and Nordhausen Railway is to take place at Berlin, on April 9. The formation is announced of the Anseremme Forges Company.

There has been comparatively little doing in copper at Paris, and the market has remained without movement. Chilian, in bars, has made 76/- per ton; ditto, ordinary descriptions, 73/- 8s.; ditto, in ingots, 76/- English best selected, 78/-; and pure Corocoro minerals, 76/- per ton. The German copper markets have presented no special feature of interest. At Rotterdam transactions in tin have been confined to the most pressing requirements of consumption. Disposable Banco has been quoted at 43/- fl.; with delivery at the approaching sale, the same description has been priced at 43/- fl. In Billiton there has been scarcely any business passing. At Paris Banco has made 77. 12s.; Straits and Billiton, 76/- Australian, 79. 8s.; and English, 76/- per ton. There has been little doing in tin upon the German markets, and prices have been almost nominal. Little has been passing in lead at Paris; French has made 21/- 4s., and lead from other sources 21/- per ton. The German lead markets have been unchanged. The Paris zinc market has been extremely quiet. Silesian, delivered at Havre, has brought 21/- 16s.; ditto, other good marks, 21/- 16s.; ditto, at Paris, 21/- 18s. per ton. At Marseilles, rolled Vieille-Montagne zinc has realised 30/- 16s. per ton. The German zinc markets have been pretty well maintained.

ECHOES FROM THE MINING MARKET.

The feeling of doubt engendered by the failure of the Burry Port Smelting Company is rapidly passing away, and during the week a very fair business has been transacted in lead shares. Many investors have seized the opportunity to increase their holdings, and the prices at which shares were obtainable soon after the news of the failure was known will enable some handsome profits to be made as soon as the affair has completely blown over. In the majority of cases the loss, we believe, will be only a temporary inconvenience. There have been some close escapes by one or two progressive mines. It was rumoured Van Consol would be a creditor, and the shares receded to 2-3/4; but it turns out the company's ore bill was due, and was paid on the 3rd instant, consequently the shareholders will not lose by the failure. Other companies were not so fortunate, and to the list given last week we must add West Chiverton, West Tankerville, and some Welsh mines.

Business in other departments has been quiet generally, although for certain shares there has been brisk demand. We may instance Exchequer, I.X.L., and Richmond in foreign, and Hindon Down and Parrys Mountain in home copper shares. Richmond although largely dealt in have receded. The colliery share market is extremely dull.

The accounts of the Javali Company for the year 1876 have been issued, and show that, although the exceptionally adverse circumstances which characterised that year had to be contended with, considerable progress has been made, as compared with past years. The ore crushed has amounted to 17,698 tons, against 8850 tons in 1873, 10,667 tons in 1874, and 14,550 tons in 1875. The value realised has nearly doubled since 1873, the amounts being 14,274/- against 7483/- The profit per ton crushed has been 4s. 3d., against 3s. 3d. in 1873, 2s. 1d. in 1874, and a loss of 2d. in 1875. So altogether the directors can fairly claim to have made steady progress towards the dividend goal. The profit on the year has amounted to 2735/-

A meeting of the North Laxey shareholders will be held on the 12th proximo. The reports from the Pandora Mine are very encouraging, and show that before long a very productive mine will be opened up. Capt. Nottingham states that at no time of its existence were the prospects so good as they are at present. There is but little news from Cornwall. The close proximity of the Elster hollies has interfered with the slight business that was doing whilst it keeps dull in price. There are symptoms, however, of some reaction from present low quotations. Stocks of the metal do not increase, and the Australian supplies are now fairly gauged. The demand for tin plates, we understand, is good, and is increasing. At Dolcoath the second rock borer in the 326 fm. level is working well. The results obtained have been very satisfactory, as three times the distance can be driven per month than if six men had been employed to drive by hand labour, whilst the cost of driving by the machine shows a reduction of 20 per cent. on the cost of manual labour. There is a good mine in the lower levels. At Wheal Agar the lode in the shaft continues as rich as last reported. The branch on the south side, hitherto poorer than on the north side, has much improved, and shows quite two thirds tin.

JAMES H. CROFTS.

THE WEEK.

SATURDAY, MARCH 24.—I mentioned last week that Roman Gravels had recently sold 120 tons to the Burry Port Company. I am glad to find this to be an error. For the correction I am indebted to Mr. F. F. Wilson, the secretary. The total commitments to the smelting company are understood to be below 1700t. The markets were extremely depressed until nearly the close, when the arrival of firm prices from Paris led to a rally. On the appearance of this recovery several "bear," well aware that settlement commences on Monday, made haste to close, so that on the whole the markets left off pretty steadily. Caledonian was forced to close below 125, but closed 125½. Great Western left off at 103½, a decline of 5s., and there was the same decline in Metropolitan District (45½ to 46), and Brighton A. (108½ to 107). Russian of 1873 closed at 85, being 5½ worse. One or two of the railway loans where wide prices prevail were reported to have lost 1 and 2 per cent. There was an average fall of 1½ in the various Hungarian issues. Egyptian, 50½ to 50¾, against 52½ to this day week. A fall of 2½, according to the Official List, took place in St. John del Rey. It does not, however, contain the trace of a transaction.

MONDAY (Continuation-Day).—Rates for carry over until next account were very easy to-day, contagio or backwarding hardly in any instance exceeding ½. This was the rate of the "back" on Russian of 1873, which made up at 84, against 83 last time. During the interval 88½ has been reached, but those who have kept open have after all only been melted in a difference of 1 per cent. It is pointed out that the expenses at Kisenchaff alone since the army was mobilised must have reached eleven millions sterling, thus seriously jeopardising the chances of the coupons being met much longer. Egyptian of 1873 made up at 49½, against 48 last time, but since then they have been dealt in at 54. No such fluctuations have taken place in railways. The prime pal alteration has been in North British, continued this time at 95½, last time at 99½, and dealt in between the two periods at 100½. Sheffield made up at 73½, same as last account. Great Eastern made up at 50½, as against 51½. The settlement showed a large and weak "bull" account, a considerable quantity of which up to the close could not be carried over, although 2s. 6d. was offered.

TUESDAY.—Until the afternoon prices were again down, and promised in several instances to finish at an important decline, but between three and four o'clock it came to be rumoured that the Chancellor of the Exchequer had made a statement indicating there was still a chance of a pacific settlement. The remarks as read late this evening are guarded, and common place enough, but the rumour fell like a shell among the dealers in the Russian market. The 1873 loan was previously dull, between 83½ and 84, but so loud and exciting was the bidding that less than half an hour forced the price up to 86, and unsatisfied operators left the building at late hour very reluctantly. Hungarian 6 per cent., 1874, advanced 2, to 84½; Egyptian, 1873, rose 5½, to 51. In railways Caledonian was a good market, and went up 1½, to 125½. Illinois Central fell to 44½.

WEDNESDAY.—Among the traffic returns to-day Midland showed an increase of 39655, North-Eastern one of 24635, Great Western one of 28974. Caledonian had an increase of 10092. Foreign bonds were again strong, especially Russian, operators apparently fearing to go away for their Easter holidays with much open for a fall. The 1875 issue rose to 81½ from 80, the 1873 closed 88½ to 85½. Caledonian fully maintained yesterday's rise, closing 12½ to 123½ ex div. (3½). Brighton A., as usual just before Easter was in demand, the last price was 107½ to 107¾.

THURSDAY.—The near approach of the Easter holidays was very apparent from the scanty attendance of members in the House. By noon the numbers had been further sensibly thinned. At the onset a disposition was shown to send prices down, but it was not long before the decline had been recovered, and in some instances an advance, notably in Russians and Egyptians established. At 12 o'clock Consols had risen ½, to 96½, 98½, and this led to firmness in the Home Railway Department. At 96½ the Government broker bought 30,600 Consols, yesterday he obtained the same amount for 96½.

FERNAND R. KIRK.

Birchin-lane, March 29.

LLANRWST.—This mine is opening out very satisfactorily, corresponding with Capt. Knapp's statement at the meeting. He said "the further they drove the deeper the lodes were being sunk upon. The veins were now productive, and the led richer in quality." Capt. Knapp says "the Van Mine was an exceptional one, but if the Llanrwst continued to improve for the next two years as it has done in the past, it will be second to no other mine in the Principality, and there is no doubt from all appearances it will do so."

SALE OF MINE MATERIALS.—Mr. John Thomas held an auction at Burra Burra Mine, on Thursday, for the sale of materials. There was a large attendance, but in consequence of the depressed condition of the mining interest in the neighbourhood, nothing but the pitwork was sold, and when we state that to place the work in its present position it cost the adventurers 4/- per ton, whilst the price realised at the sale was 2s. 10d. per cwt., some idea may be gathered of the condition of the market for mine materials; yet the purchasers, Messrs. Harvey and Co., of Hayle, and Messrs. F. W. Michell and Co., declined to advance upon that price, and the engine and much of the machinery remained unsold.—West Briton.

LETTS, SON, and CO. (LIMITED), whose name as publishers of diaries has for so long been associated with the Royal Exchange, have removed to No. 33, King William street, London Bridge.

WILTON'S MATHEMATICAL INSTRUMENT ESTABLISHMENT,
REMOVED FROM ST. DAY TO A. JEFFERY'S, CAMBORNE.

W. H. WILTON begs to thank his friends for their liberal support for so many years, and informs them that (having opened business at Valparaiso) he has now declined business in England in favour solely of Mr. A. JEFFERY, MATHEMATICAL INSTRUMENT MAKER, CAMBORNE, whom he considers (having been an assistant to his father for several years) is in every way capable of creditably maintaining the good name universally awarded to Wilton's instruments.

A. JEFFERY

Mining Correspondence.

BRITISH MINES.

ABERDAUNANT.—S. Toy, March 28: The men that are engaged in cutting down the new shaft will, I think, finish it to the back of the deep adit level the latter part of next week, also finish their contract, when I will set them to square it down to the bottom of the level (7 ft. deeper), and cut a plat, take up all top water, &c., which must be done before we can sink the shaft below the deep adit level. In the east part of the sett (Crowlwin) in the cross-cut driving towards the new lode we have cut a stream of water in the bottom of the forebreast, which has drained the level dry behind us, but we have not yet met with the lode.

BLUE HILLS.—S. Bennetts, A. Gripe, March 24: The north section of the lode has not yet been reached in the rise on the gossan above the 80. There is, however, a large stream of water issuing from the top of the rise, which indicates a near approach to the lode. On the south side of this gossan the lode is worth 10s. per fathom on the west side of the shaft. During the past few days we have utilised a falling stream of water in the shaft for the purpose of ventilating the rise and stopes, and succeeded in doing so very satisfactorily.

BODIDRIS.—H. Hotchkiss, March 28: The 60 yard level cross-cut driving south for Maes-y-pwll lode has undergone a very sudden change: the end is now workable for 4 ft. wide, containing spar, clay, and boulders of limestone, and letting out water freely. This is a very important change, as it will enable us to make much better progress. There is also a slight improvement for lead ore and blende in the 45 yard level driving east, on main lode, although we are not as yet through the 45. All other points of operation are without change worthy of note. Everything is going on regularly and with all speed possible.

BRONFLOYD.—Thomas Ken, March 28: **No. 3 Shaft, North Lode:** The sinking of this shaft below the 110 is urged on with all practical speed, and fair progress is still being made. The stops and other bargains throughout the mine are without any change worthy of notice since my last report. As instructions have been given to Mr. Green to get on with the new water-wheel and machinery it is advisable that we should at once commence to cut the ground for the wheel-pit, &c., so that there may not be any delay in carrying out this work. The 25 tons of ore sold to the Panther Company on Wednesday, 21st instant, realised 15/- 15s. per ton. Hauling and dressing going on with regularity, and we are pushing on as fast as possible with our next sampling. Machinery in fair working order.

CLEMENTINA.—W. Bennetts, March 28: I am glad to inform you that the lode in the engine-shaft is now worth 1 ton of lead per fathom. It is a splendid looking lode. The 25 end has again improved, and is now worth 15 cwt.s. of lead per fathom.

March 27: The lode in the engine-shaft is still worth 1 ton of lead per fathom, and by its kindly appearance a further improvement may be expected. The 25 end south has further improved, and is now worth 1 ton of lead per fathom, and is looking promising for further improvement.

COMB MARTIN.—E. Hosking, March 24: Since I last visited the mine Harris's shaft has been cleared to the 28. The last 3 fms. have been difficult to do in consequence of the ground having broken away at each end of the shaft, which requires it to be firmly timbered and secured. This has been done, and the 25 cross-cut cleared and secured for 2 fms. south of the shaft. The men are now daily expecting to reach the lode. When this is done we anticipate finding lead ground, which will pay to work, as one of the men now working in the mine worked in the 28 at the last working, and says the lode there will yield 1/2 to 1/2 ton of silver-lead per fathom, and that a vein is communicated from the 28 to the 42 (or deep-adit level) the end of which will yield lead that will set on tritium. The capel part of the lode is now showing in the level, and contains muriatic and spots of lead. Seeing that it is highly important to clear the 28 as quickly as possible we have put on three additional men, so that no time shall be lost, and we hope to get the stuff cleared out in a few days. The 15 has been driven 7 fms. during the last four weeks. The end is now producing lead for the whole distance. The lode in the end is 2 ft. wide, producing saying words for silver lead. I am of opinion that we shall get a finer lode at and below the 28.

CWM ELIAN (NEW).—J. Goldsworthy, March 24: There is no material change to notice in the underground bargains since my last report. I beg to call your attention to an important point; I should strongly advise you to drive the 10 west and south for further improvement, and is now worth 1 ton of lead per fathom, and is looking promising for further improvement.

DERWENT.—John Morpeth, March 26: Setting Report for April: Jeffries Shaft, Middle Vein: This vein in the 95, 43 fms. east of shaft, is still very promising. We are taking 2 ft. of the vein in the level, and for this width it produces 8 cwt.s. of ore per fathom. Over this level we have seven bargains, the first a stope 35 fms. east of the shaft, yields 17 cwt.s. of ore per fathom, vein 4 ft. wide; the second, a stope 30 fms. east of shaft, yields 20 cwt.s. of ore per fathom, vein 3 ft. wide; the third, cutting shaft on the north side of vein, which are rich, and worth at least 2 tons of ore per fathom, looking well; the fourth, a stoppe 22 fms. east of shaft, vein 3 ft. wide, but yielding only 11 cwt.s. of ore per fathom; the fifth, a stoppe 18 fms. east of shaft, producing 14 cwt.s. of ore per fathom, vein 4 ft. wide; the sixth, cutting south side of vein, 15 fms. east of shaft, vein coarse, worth 14 cwt.s. per cubic fathom; and the seventh, a stoppe 15 fms. east of shaft, worth 15 cwt.s. per cubic fathom, vein 4 ft. wide. The cross-cut at the 95 opposite shaft has been extended northwards the last month 4 fms. 1 ft. 4 in., now across 15 fms. 6 in. The 95, 100 fms. west of shaft, is in a strong vein 4 ft. wide, and produces 8 cwt.s. of ore per fathom. The three stopes following this end in the back are yielding strong boulders. No. 1, 21 fms. west of shaft, is 7 ft. wide, and produces about 19 cwt.s. per cubic fathom. No. 2, 93 fms. west of shaft, is 8 ft. wide, worth 32 cwt.s. per fathom. No. 3, 95 fms. west of shaft, is also 8 ft. wide, but coarser, worth 21 cwt.s. per cubic fathom. Sun Vein: The cross-cut at the 70 from shaft was driven last month 2 fms. 5 ft. 6 in., without making any further discovery. The distance this cross-cut has now been extended southwards is 23 fms. 1 ft. 3 in., and we have deemed it best to stop the cross-cut, and to put the men to sink the vein where there was such a lively flat under the cross-cut a few months ago, to prove the low flat of the little limestone.—North Vein: This vein in the 50, 195 fms. east of Reid's shaft, is small and poor.—Taylor's Shaft, Middle Vein: This shaft is now repaired down to the 40, a point some 92 fms. under surface. The cross-cut at the 40, 120 fms. east of shaft, was driven last month 2 fms. 1 ft. 8 in., and is now across 14 fms. 3 ft. 4 in. We have lately passed through some open joints or streaks, and we should in 2 or 3 fms. more cut the north part of middle vein.—Westgarth's Shaft, Middle Vein: The 74, 152 fms. west of shaft, is 2 ft. wide of vein, and worth 18 cwt.s. of ore per fathom. The stopes over this level yield 20 cwt.s. per fathom; vein 3 ft. wide. The 95, 37 fms. east of shaft, has the last month been driven by the side of vein, and until we strip it down we cannot give its size and value. The level and the 74 are both standing till we get the pulley framing at Westgarth's shaft completed, which work would not occupy us long now if the weather would only permit. The machinery is working fairly.

DEVON GREAT CONSOLS.—J. Richards, March 29: Wheat Anna Maria: In Backwell's shaft sinking on the new south lode the lode continues about 2 ft. wide, consisting of gossan, capel, quartz, and muriatic.—Engine-Shaft: In the 80, west of Jeffry's cross-cut, on the new south lode, the lode is 1½ ft. wide, composed of capel and quartz.—Wheat Emma, New Shaft New South Lode: In the 175 the east part of the lode continues 2 ft. wide, worth 1 ton of ore per fathom. In the 175 east on the south part of the lode, the lode continues large, 5 ft. of which is being carried, in which there is a leader of ore worth 1 ton per fathom, and a branch of muriatic about 1 ft. wide. In the 180 east the lode is improving, and is now worth 6 tons of ore, or 20/- per fathom. In Gorrell's winze, sinking below the 160 east of the lode is being carried, which is worth for the length of the winze, 9 ft. from 6 to 7 tons, or 20/- per fathom. In the 145 east the lode is 2½ ft. wide, worth 1 ton of ore, or 4/- per fathom. In Toy's winze, sinking in the bottom of the 145 east, 3 ft. of the lode is being carried, which is a good course of ore, yielding for the length of winze (9 ft.) 9 tons, worth 35/- per fathom, with a valuable portion of the lode stretching north. In Bickles' winze sinking below the 130, west of Tregay's cross-cut, the lode is further improved, and is now worth 7 tons of ore, or 25/- per fathom. In the 100 east, and east of Kitto's cross-cut, the lode is 2 ft. wide, worth 3 tons of ore, or 10/- per fathom.

EAST DAREM.—March 27: In the 130, west of Skinner's shaft, the lode is 1½ yard wide, yielding small spots of lead ore, but not of any value. In the 130, east of Lewis's winze, the lode is about 2 ft. wide, composed of a light clay-slate, carbonate of lime, and small branches of lead ore, but not sufficient to value. Pearce's winze under the 118 is down the required depth for the 130; the lode is small, soft, and poor at this point. We shall drive westward to communicate to the 130 east. In the 20, west of cross-cut on the south part of the lode the lode has much improved, being composed of a light clay-slate, carbonate of lime and lead ore, yielding of the latter about 1 ton per fathom. The tribute pitches through the mine are without change to notice since last reported on. Our machinery is in good working order, drawing and dressing being steadily carried on with a full supply of water.

EAST VAN.—Wm. Williams, March 27: The cross-cut south at the present end is in 4 fms.; we eat into water here to-day. I believe this is a very good trial, and that we shall not be very long before we discover lead here. The drivings east and west of Tempest shaft look very kindly, both producing good stones of ore, but not yet rich enough to value. No change of importance in any other part of the mine. You will have a full report next week with setting list.

EAST WHEAL LOVELL.—R. Quenell, March 28: Fatwork: We have opened out the south side of the shaft about 9 fms. below the 100 to granite, and are satisfied that we have sunk on the main part of the lode. We have put six of the men to drive the 100 west, as we wish to see if it will improve in that direction; the lode is 2½ ft. wide, containing a little tin. We have got through the lode in the cross-cut north at the 17, and find it 18 ft. wide. We have commenced to drive east and west with a full pair in each end, and from the appearance of the lode we think there is a very good prospect of our meeting with a run of tin ground.—Tregonebir: The lode in the adit west is 8 in. wide, and there are some small branches coming into it from the north containing a little tin, which I think likely to improve the lode. Last week the lode in the shaft below the adit did not look so well, but it is now worth quite as much as last reported—12/- per fathom for length of shaft.

FRANK MILLS.—J. Rowe, N. Addems, March 29: The lode in the 100, north of engine-shaft, is disorderly by a slide, and we are cross-cutting west of the present end to meet with it. The lode in the winze sinking below this level is producing 1 ton of lead ore per fathom. The stopes in back of this level is yielding 12 cwt.s. of lead ore per fathom. The stopes in the back of the 84, north of the engine-shaft, is producing 6 cwt.s. of lead ore per fathom. The lode in the 72, north of the cross-cut, west of the boundary rise, is composed of sphene iron, and producing a little lead. The stopes in the back of this level is yielding 7 cwt.s. of lead ore per fathom. The lode in the stopes in the back of the 60, north of the boundary rise, is disorderly by the flood, but by present appearance it will improve again shortly. The stopes in the back of the 45, south of east cross-cut, north of Orchard air-shaft, on the east branches, are producing 8 cwt.s. of lead ore per fathom. The tribute department is producing moderate quantities of lead, and the men are making discoveries of importance. The foundations of the new crusher and engine-house for treating the large quantities of halvans on the mine are nearly completed, and we shall be ready for the masons in a day or two.

GAWTON COPPER.—George Rowe, G. Rowe, jun., March 27: The lode in the 132 fm. level east is 4 ft. wide, and worth 6/- per fathom. The lode in the stopes below the 117 is 6 ft. wide, and worth 14/- per fathom. The lode in the 105 east is 3 ft. wide, and unproductive. The ground in the cross-cut driving south at the 105 is highly mineralised, and showing indications of being near the south lode. The lode in the 82 east is 4 ft. wide, of a most promising appearance, producing very strong muriatic, with good stones of ore. The ground in the 82 cross-cut south is improved for progress, and showing indications of being near one of the south lodes. At other points we are without change. We are busily engaged in preparing for our next sampling, which we calculate will be about 200 tons of copper ore.

GREAT DYLIFFE.—Edward Rogers, March 28: **Dyliffe Lode:** The 132 is driving east of engine-shaft, by six men, at 7/- 10s. per fathom, lode worth 18/- per fathom. At this level, west of the shaft, there are six men stopping the back, at 4/- per fathom, lode worth 16/- per fathom; we shall commence driving the end again about the middle of the present month. In the 120, west of boundary shaft, we are stripping the side of the level, by four men, at 4/- 10s. per fathom, lode worth 8/- per fathom. The winze in bottom of the 120, east of shaft, is sinking by the footwall side of the lode, by three men, at 7/- per fathom; the lode when last cut was worth 16/- per fathom. At the 105, east of cross-cut, the rise is set to six men, at 9/- per fathom, lode worth 20/- per fathom. In the bottom of this level west two men are sinking a winze, at 7/- per fathom, lode worth about 7/- or 8/- per fathom. The 90 four men are put to cross-cut north, at 9/- per fathom. The 80 four men rising at 1/- per fathom, lode worth about 90/- per fathom. To drive south we have to drive 6 ft. further, at 8/- per fathom. We shall next week commence to sink No. 4 winze below this level. The 70 cross-cut to drive east, by two men, the rise and putting back stuff in the old workings. In the meantime we are preparing the timber for casing and dividing it, and hope to make it all complete to 60 by the latter part of next week, when no time will be lost, in sinking below, at the cross-cut west, in this level, we have passed through a branch or hole formed to drive 6 ft. further, at 8/- per fathom. The 60 west is worth 10/- per fathom. The 50 west is worth 8/- per fathom. The 40 east is worth 10/- per fathom, and have drained off the shallow drift, or

part of the lode close to the end, by four men, the mouth, at 3/- per fathom, worth about 10/- per fathom. No 2 winze to sink below the level, on the west part of the lode, by two men, the mouth, at 7/- 10s. per fathom, worth about 7/- per fathom—most promising lode. No. 1 stope in the back of the 80, by four men, the mouth, at 50/- per fathom, worth 9/- per fathom. No. 2 ditto, by four men, the mouth, at 3/- per fathom, worth 8/- per fathom. No. 3 ditto, by four men, the mouth, at 3/- per fathom, worth about 90/- per fathom. To drive south we have to drive 6 ft. further, at 8/- per fathom. The 60 west is worth 10/- per fathom. The 50 west is worth 8/- per fathom. The 40 east is worth 10/- per fathom, and have drained off the shallow drift, or

the 30 fms. of this (No. 2) lode is being worked, which the ore is being within the last day or two, and the water is also being worked, and bearing part of the lode.

PANDORA.—H. Nottingham, March 28: There is no material change since the last report, the different bargains being equal to last valuations.

PATELEY.—C. Williams, March 28: The very favourable improvement continues in the 30 east, on Rake vein, and yesterday the men have cut into

the rib of steel grain ore on the south or hanging side of the vein, and in all altogether presenting an exceedingly favourable feature. The ground is becoming more speedy for progress, and letting out much water. The 30 ground is becoming

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est, is worth 8*l.* per fathom. The 50, east of cross-cut, is worth 6*l.* per fathom. The 60, in the back of the 60, is worth 10*l.* The 60 west is worth 9*l.* per fathom. The rise in the back of the 60 is worth 10*l.* per fathom. The sink in the bottom of this level is worth 15*l.* per fathom. The 50 west is worth 8*l.* per fathom. The rise in the back of the 70 is worth 12*l.* per fathom. The 80 east is worth 8*l.* per fathom. The winze in the bottom of this fathom. The 80 east is worth 10*l.* per fathom. We have driven clear of the run in the 93 west, and have drained off the water.

SOUTH CWMYNTSWITH.—John Kitto, March 23: The winze sinking below the shallow adit, on No. 2 lode, is still very good, and worth fully 2 tons of lead ore to the ft. The intermediate level cross-cut has been driven through the hard part of this (No. 2) lode 49*ft.*, but has not yet reached the south side or wall, against which the ore is being gotten in the winze above referred to; we have, however, within the last day or two been having some strong spots of ore in the cross-cut, and the water is also increasing, and I expect in a few days to get fairly into the bearing part of the lode, and have but little doubt that we shall find it rich in ore. Good progress is being made in every other part of the mine, but there has been no change since my last report that calls for any special remark.

SOUTH DARRÉN.—H. James, A. Gundry, March 27: The lode in the 90 end continues to be hard and massive, and has been cut through 6*ft.* without reaching the north wall; value at present time 37*l.* per fathom; driving at 11*l.* per fathom. The stop in the roof of the above level is worth 8*l.* 10*s.* per fathom; stopping at 3*l.* 10*s.* per fathom. The drawing machine is erected, and the skip-road completed for drawing from the 80. We are now working the machine to get the friction cones to bear properly in order to draw stuff, which we hope to do this week. The rollers and a great part of the crushing mill is fixed, also some of the slatings for connection with jiggers, and we expect both the departments to be ready for work in a fortnight. The new boulders and other necessary machinery have yet to be sent from the foundry, and put in; but we intend to commence drawing with the old boulders, &c., and to fix the new ones while so doing.

SOUTH TOLCARNE.—W. Rich, W. Hambley, March 27: We intend to continue the osteaming in the eastern part of the set a few days longer, and if we find no other lodes of importance we shall sink a trial shaft on South Condurrow tin lode to prove its underlie. Fraser's lode in the 50 east is large, probably 8*ft.* wide, but so far not rich. There has been no further improvement since my last report in the 35 east, neither has there been any change of importance in the stops in the back of this level, or in the 48 cross-cut, driving towards the south lodes.

TANKERVILLE.—A. Waters, March 28: The 180, east of Watson's shaft, is in a strong lode, worth 3 tons per fathom. The 180 west has narrowed up of late, now worth 2 tons per fathom. This twitch is only temporary, for the end is very wet, and a wider and richer lode is near at hand. The 167 east is improving as we advance, and there is now every sign that the ore ground is dipping east, and not west as formerly. In the 152 cross-cut north, at a point 9*ft.* west of shaft, we have just cut into a very nice looking ore lode. Full report on this point next week. The adit end east, on the gossan lode, is yielding stones of rich copper.

S. HARMON.—John Kitto, March 23: We have got through the lode in the 65 cross-cut, west of the engine-shaft, but have had no ore in it to value, and have again resumed the driving on the course of the lode. In the same level east of shaft, we have cross-cut 3*l.* fms., and there is a strong feel of water issuing from the end, which strongly indicates more lode further south, and this cross-cut will be continued until it is fully proved. In the 35 driving west the lode is large and kindly, and yields strong spots of lead and blende ores; a very fine-looking lode, but so far not rich. There has been no further improvement since my last report in the 35 east, neither has there been any change of importance in the stops in the back of this level, or in the 48 cross-cut, driving towards the south lodes.

TANKEVILLE.—Thomas Watson, March 26: North Workings: I am glad to say that the men have cut into a part of the vein here, which is looking well, and shows good ore. We have had to cut 1*l.* through drift and ground, as our vein is thrown or heaved by distance by an intersection with an east and west vein. It is yet hard for exploring, being chiefly composed of a blue clay slate, hard bars of spar, and quartz, containing stones of copper, and small branches of lead ore, but not sufficient to value. In the engine-shaft we have nearly completed cutting the same down to the full width of the shaft, containing a mixture of both copper and lead, and looks promising for becoming productive in depth. In the 33, east of engine-shaft, the lode has become disordered by cross joints and less productive, and yields strong spots of lead and blende ores; a very fine-looking lode, but so far not rich. There has been no further improvement since my last report in the 33 east, neither has there been any change of importance in the stops in the back of this level, or in the 48 cross-cut, driving towards the south lodes.

TREBLEIGH CONSOLES.—John Gifford, March 29: I have to day set the cross-cut, north of Ward's engine-shaft, at the 30, to drive by six men, stent 4*fms.*, at 4*l.* 10*s.* No change to notes since my report for the general meeting.

VAUGHAN.—March 27: In the deep level, east of engine-shaft, on north part of lode, it is hard for exploring, being chiefly composed of a blue clay slate, hard bars of spar, and quartz, containing stones of copper, and small branches of lead ore, but not sufficient to value. In the engine-shaft we have nearly completed cutting the same down to the full width of the shaft, containing a mixture of both copper and lead, and looks promising for becoming productive in depth. In the 33, east of engine-shaft, the lode has become disordered by cross joints and less productive, and yields strong spots of lead and blende ores; a very fine-looking lode, but so far not rich. There has been no further improvement since my last report in the 33 east, neither has there been any change of importance in the stops in the back of this level, or in the 48 cross-cut, driving towards the south lodes.

WEST GOGGINAN.—John Kitto, March 23: I have no improvement to report to you in any part of the mine. The winze sinking below the 24 is not so good at present as it was when I last wrote, but I expect the falling off in value to be only temporary. The 36 driving west is now in the same run of unproductive ground as we have passed through in each of the levels above, and I believe this is also making its appearance in the engine-shaft, which is being sunk below the 36, and is now down about 4*fms.* Should this prove to be the case the very ground through which we have sunk will be found to have dipped away to the east, and at our next level (48) I should propose to drive eastward, and prove the runs of ore bearing ground that we have driven through in the adit and 10*ft.* level, the latter being the deepest point at which the lode has been seen in this direction, and judging from appearances in those levels I firmly believe that we shall find it to be profitably productive.

WEST TANKERVILLE.—Arthur Waters, March 28: The sinking of boundary shaft below the 15 is progressing fairly, and we hope to be deep enough for the next level in a month from this date. The 75, south of shaft, is worth 1 ton per fathom, and improving. This end is within 4*l.* fms. of being up to the winze from the 65. Stop in the back of the said level is worth 1 ton per fathom. The 65, south of said shaft, is worth 1 ton per fathom. Other points are the same as for the 65 west.

WEST WHEAL TOLGUS.—March 28: There is no alteration in Taylor's shaft since last report. The lode in the 135 end east is larger 2*l.* 1*l.* wide; a kindly lode, with a little ore. The lode in the 135 end west is yielding from 6 to 7 tons of ore per fathom, and the north part still standing; this is looking very well. Stope in the back of this level are quite up to the mark, and looking very well. No. 4 winze in the bottom of the 125 is looking a little better; lode 5*ft.* wide, and yielding 10 cwt. of lead ore per fathom. The lode in the rise in the back of the 125, west of shaft, is small, with a little ore; looking more hopeful. The lode in the 115 west is small; only just dividing the walls, but ground better. Richard's shaft is down to the 35, and a little below for a fork. We shall now drive a cross-cut north to make a plat before we begin to drive east. The stope in the back of the 85 are looking very well; yielding 3 tons of ore per fathom. The lode in the 75 west is small and poor. The same may be said of the 65 west. Our monthly setting will be held on Saturday.

WEST WYE VALLEY.—John Kitto, March 24: Brooks' shaft is now down between 7 and 8*fms.* below the 26, and very fair progress is being made in the sinking of same. The small portion of the lode we are carrying in the shaft contains strong spots of ore, but we can form no idea as to what may be standing in the north part, neither shall we be able to ascertain until we reach the 40, where we shall cross out the lode to full width, and also drive east and west on its course. The ground in the 40, east of the main shaft, has got easier for driving, and much better progress is now being made, but the lode has not yet resumed its producing qualities; we know, however, that there are some good bunches of ore before us, and the same remarks equally apply to the 40 west. We have commenced to cut out ground for crusher-house and wheel pit, and shall push on with the same as rapidly as possible, and the crushing-mill, jiggling-machines, and other dressing machinery, are all in the way of making, and I think will be ready in good time.

WEHLE CREBROB.—J. Andrews, March 26: The following was our setting on Saturday: To drive the 120 end east, by six men, at 8*l.* per fathom; lode 3*ft.* wide, worth 10*l.* per fathom. To drive the 108 end east, by four men, at 6*l.* per fathom; lode 4*ft.* wide, worth 8*l.* per fathom. To stope in the back of the 108 east, by six men, at 9*l.* per fathom; lode 5*ft.* wide, worth 20*l.* per fathom. To sink a 10*ft.* below the 108 by the side of the lode, by nine men, at 7*l.* per fathom. To drive the 72 end east, by two men, at 6*l.* per fathom; the lode in the end is large, but unproductive. To drive north through the lode at the 48 east, by four men, at 9*l.* per fathom; at this point we have been carrying 2*l.* 4*ft.* of the south part of the lode, which yields good stones of ore, but we are now going to cut through it, so as to ascertain its width and value. To stope the bottom of the 48, by six men, at 11*l.* per fathom; lode 2*l.* 2*ft.* wide, worth 12*l.* per fathom.

WEHLE KITTY (St. Agnes).—S. Davey, R. Harris, March 24: New Shaft, Priors' Lode: The men are making good progress with the sinking of this shaft below the 15*l.* The lode in the 15*l.* is producing good quality tin-stuff. The branch in the 15*l.*, driving west, is at present poor. The lode in the 14*l.*, driving west of the shaft, is 6*ft.* wide, and worth for tin 8*l.* per fathom. The lode in the 14*l.*, driving east of shaft, is worth for tin 8*l.* per fathom. The lode in the 14*l.*, driving north on the caunter, 1*l.* 2*ft.* wide, and worth for tin 10*l.* per fathom. We have resumed the driving of both the 11*l.* and 9*l.* west; no lode has been taken up in either, nor will be for another week. The lode in the 6*l.*, driving west of the shaft, is 3*ft.* wide, and worth for tin 9*l.* per fathom. The lode in the 10*l.*, driving west of the engine-shaft, is 2*ft.* wide, and worth for tin 7*l.* per fathom. The lode in the 9*l.*, east of sumpt, is worth for tin 8*l.* per fathom.

WEHLE UNY.—W. Rich, M. Rogers, J. Rich, March 26: The lode in the rise in the 9*l.*, west of incline shaft, is worth 12*l.* per fathom. The 130, east of King's, is worth 7*l.* per fathom. The 140 east is worth 10*l.* per fathom. The rise in the 15*l.*, east of Gooding's, is worth 8*l.* per fathom. The lode in the back of the 15*l.* west is worth 12*l.* per fathom. We have set the men to rise in the 13*l.* west, and hope soon to meet the shoot of tin seen in the 15*l.*

WEHLE VALEY.—John Kitto, March 24: I am pleased to be able to inform you that the 22 end, driving east on the south part of the lode, has continued to improve since the date of my last report, and for several days past has varied in produce from 20 to 30 cwt. of lead ore to the fathom, and never looked better than it does at the present time. Should this continue, as I only hope it will, we shall soon open out some good ground for stope, and be again able to increase our rations and sales of ore. The winze from the 10 to the 22 has been communicated, and the 22 end east is now about 8*fms.* in advance of the same. We are cutting at the 24, and preparing for sinking the main engine-shaft below the same for a new 4*l.*, and shall be ready to commence sinking in a week or ten days from this time. Fair progress has been made in rising towards Tipper's shaft near the end of the eastern adit level, and we shall find this to be the cheapest and best means that can be adopted for communicating with the surface in this part of the mine, and more particularly so should the season prove to be a wet one. We have been making vigorous efforts during the last month or two towards making fresh discoveries, but the 22 end east has, so far, proved the most successful, and I am

glad to say our prospects at present are much better than they have been for some time past.

FOREIGN MINES.

RICHMOND CONSOLIDATED.—Telegram from the mine at Eureka, Nevada-Hall, London: Week's run, \$40,000; week's produce of refinery, \$10,000.

—R. Rickard, March 3: The 900 ft. drift is progressing favourably; it is still in quartzite, and easy ground for driving. The 800 drift, on seam, is about the same as last reported; the seam widens and closes every few feet. No change in No. 1 winze, sinking below the 800. The 700 drift has struck a small streak of ore lying near the shale; we expect shortly to strike the main body. The 600 is opening out splendidly; we have drifted across the ore body a distance of 100 ft., and the end is still in good ore; we expect to cut this ore body in the 700 very soon. We have also started a winze in the bottom of this level; it is down 12*ft.*, with the bottom in good ore. The 400 is looking about the same. The stope are without change, producing their usual quantity of ore.—Smelting: This week we have had trouble with our machinery; the main pulley in the engine-shaft cracked in the nut; I had wrought-iron bands put on temporarily. I have had cast-iron strengthening pieces made, which we shall put on on Monday. It will retard the smelting about 18 hours to get them on, but when this is done it will be stronger than it was when new. No. 5 hydrocyde has been shut down this week for repairs; we shall start it up again on Monday. All the other furnaces are in good working order.

PITANGUL.—Mr. Hilleke (Parl., Feb. 12) reports that the adit had been driven 4*fms.* 5*ft.* during January, in which distance in the ground had been met with, the last fathom being extended in a very hard rock, which still continues, and checked the progress of the driving. At the exploration at Morro das Almas a large quantity of jacutinga had been cleared out of a corregos, of which the fine stuff was passed over skins, and proved auriferous, but the gold obtained 4*l.* 10*s.* —is not coarse enough to come from a gold vein. A place had been prepared for driving a level towards this bed of jacutinga, and exploring the same from 25 to 30 fathoms below surface, and a cart-road had been made to take timber for driving to the spot, but the unfavourable weather which set in since the beginning of February had suspended operations here, as an almost incessant rain had filled up the corregos again with debris, and washed away the newly-made road. The adit end east, on the gossan lode, is yielding stones of rich copper.

S. HARMON.—John Kitto, March 23: We have got through the lode in the 65 cross-cut, west of the engine-shaft, but have had no ore in it to value, and have again resumed the driving on the course of the lode. In the same level east of shaft, we have cross-cut 3*l.* fms., and there is a strong feel of water issuing from the end, which strongly indicates more lode further south, and this cross-cut will be continued until it is fully proved. In the 35 driving west the lode is large and kindly, and yields strong spots of lead and blende ores; a very fine-looking lode, but so far not rich. There has been no further improvement since my last report in the 35 east, neither has there been any change of importance in the stops in the back of this level, or in the 48 cross-cut, driving towards the south lodes.

SANTA BARBARA.—Mr. Hilleke (Parl., Feb. 12): During January 1876 10,000 tons of mineral were stamped, yielding 3,213 tons per ton, or a total of 34,733 tons of gold, which, valued at \$8. 6*l.* per ozt., amounts to 17*l.* 7*s.* as the estimated value of the produce for the month. The mine working cost for the same period was, at exchange 25*l.* 4*s.*, 10*l.* 10*s.* 0*d.*, thus leaving an estimated profit of 44*l.* 0*s.* 5*d.* for January. The cost for the month was higher than usual, principally owing to extra outlay for labour, making excavation for new whim, and the increased price of provisions. The capital expenditure during the month—No. 5 stamps—amounted to 67*l.* 0*s.* 10*d.* The quantity of ore raised during the month amounted to 1,432 tons, of which 35 tons were rejected as refuse stone, and 10,800 tons treated at the stamps. Average quantity of ore raised per ton for the month is 1*l.* 1*s.* 1*d.*

—Mr. Hilleke, Feb. 12: February having set in with torrents of rain, I very much regret to inform you that our water-courses have been sadly damaged by large landslips. And under date Feb. 16 he writes—Since I wrote on the 12th Inst. I much regret to state that more damage has been done by the rain. I trust we may have a change in the weather soon, for I am anxious for the consequences should the rain continue much longer. I hope in my next to have better news to communicate.

EXCHEQUER (Gold and Silver).—Lewis Chalmers, March 5: Mr. O'Hara has yet a few days to work, and so have I, and I think I shall be able to start the mill on Saturday or Monday. Until the flume is repaired I have no water. I expect mill hands and superintendent to night. I have been in correspondence with a great many mill foremen. This man—E. Jones—is well recommended by Prof. Price. You may rely on my starting the moment I am ready. My foreman reports that the 100 ft. stop, No. 2, was driven during the week 8*ft.*; vein consists of 2*ft.* of first-class ore and 1*ft.* mixed with good ore. The 200 ft. stop, No. 1, was driven 19*ft.*; the vein consists of 2*ft.* of No. 1 pay ore and 1*ft.* 8*in.* mixed with good pay ore. The 300 ft. stop, No. 2, was driven 12*ft.* Three sets of timber were put in the 400 ft. drift; 6*l.* car loads of ore sent up.

LX. (Gold and Silver).—Lewis Chalmers, March 5: While I was examining

the face of the 200 drift on Saturday afternoon the miners struck into what is more like a fissile rock, which still continues, and checked the progress of the driving. At the exploration at Morro das Almas a large quantity of jacutinga had been cleared out of a corregos, of which the fine stuff was passed over skins, and proved auriferous, but the gold obtained 4*l.* 10*s.* —is not coarse enough to come from a gold vein. A place had been prepared for driving a level towards this bed of jacutinga, and exploring the same from 25 to 30 fathoms below surface, and a cart-road had been made to take timber for driving to the spot, but the unfavourable weather which set in since the beginning of February had suspended operations here, as an almost incessant rain had filled up the corregos again with debris, and washed away the newly-made road. The adit end east, on the gossan lode, is yielding stones of rich copper.

PROVIDENCIA AND NEW ROSARIO.—M. V. Cumins, Feb. 13: 550 cargas (about 83 tons) of ore have been sent away to the hacienda, which with the amount that was already there makes a total of 597 cargas (about 99 tons). Two tortas each of 250 cargas (39 tons each) have been formed and incorporated during the last two or three days. The number of cargas over and above the 500, with about 2*l.* to 3*l.* per ton, which yet remain to be sent away, will enter the barrels. —San Diego Mine: On continuing to sink at a depth of about 2*ft.*, the disordered part of the lode, on the eastern side, gave place to some very good looking quemazon, and to the west of it white spar, with good pintas in it, commenced to take the place of the horse. Yesterday morning Captain Skewes broke down three costales—weighing about 7*lb.* each—or the quemazon, and after bruising down the rough with the small took out a sample that has been sent to Mr. Parras to be assayed. As no change in the lode has appeared on the south side of the winze, we may, I think, with the present improvement to the north, consider our prospects equally as encouraging as ever they were.—San Miguel (South): This cross-cut has been driven 2*l.* 2*ft.* through porphyritic rock and narrow ribs of spar underlying east. How soon we shall intersect the lodes we seek will depend upon their having increased or lessened their underlie.—San Miguel (North): Western Cross-Cut: This cross-cut has been driven 1*l.* 80 varas (about 5*ft.*) in the fortnight, and the last varas were through a tolerably good azque, worth about 9 to 10 mares per monton (9 to 10 guineas per ton). Since these measurements the men have cut in about 6*l.* further into a much higher class ore. There are no indications as yet of our being near the wall, and the appearance of the lode is very encouraging.

NEW ZEALAND KAPANGA (Gold).—J. Thomas, Feb. 10: After completing

and setting to work the water wheel underground in the 50, attaching pumping and winding gear to it, dropping a lift of pumps, and forcing the water from the winze sunk on the Coronelând shoot of gold ground during the past four weeks we have cut down, enlarged, and timbered the winze through old stope 3 fathoms under the 50, and have sunk on the course of the lode 2*l.* fathoms in solid ground. I am carrying the winze 5 wide and 10*ft.* long with timber, to have sufficient room for pumps in one end and a double skip road in the other, the water and stuff being pumped and wound free of cost by the water-wheel to the 50 fm. level. The lode in the bottom of the winze is 2*ft.* wide, it is regular, and well defined, keeping with the hard evan hanging-wall, which underlies most regularly about 4*l.* west; the footwall consists of a stiff-working but kindly-looking killing kilas stone, the lode sticks hard to the hanging-wall, and is composed of soft rubby quartz, and small branches of the same mixed throughout—a nice-looking, soft, blue flockan, which always carries gold, at times occasional small specimens of rich gold quartz are met with in the flockan, with a quantity of fine black mundic, and when washed shows fine loose gold, showing that the lode is highly auriferous. The lode, as it is at present seen will turn out 4 or 5 tons of crushing stuff per fathom, and will yield about 1*l.* of gold to the ton of stuff. No

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class ore, and 1 ft. 8 in. mixed with good pay ore. The 300 ft. stope had been driven 12 ft., and in the 400 three sets of timber (No 2) had been raised. The mill foreman has been fixed; 61 carloads of quartz were raised. The mill foreman has been selected upon the recommendation of Prof. Price. L.X.L. $\frac{1}{2}$ to 1 $\frac{1}{2}$; the adit to March 5 states that in the face of the 200 ft. drift quartz has been struck more like the L.X.L. proper than anything seen on this level and the manager hoped in his next to be able to make a very favourable report. The lode has 5 ft. of solid quartz, with bunches of apparently good ore, looking (the foreman says) like the ledge and ore in the old upper tunnel which this drift is under. The rise is in fine-looking ledge matter, with streaks of apparently good ore in the face, and getting into solid quartz. The older ledge has been cut through 30 ft. from the main shaft, is well defined, and running 20° north of west. Everything is in and about the mine is running and working well. Colorado Terrible, 1 $\frac{1}{2}$ to 2; the special resolutions passed on March 9 were confirmed on Wednesday. The agent telegraphs—"Fifth level dry, new pump works splendidly." The heading of the fifth level is driven 110 ft. into the ground now purchased, and beyond the company's patented lines. When work was suspended two years ago the lode in the end still showed the rich vein of ore for which the mine is famous. The ground available for stopping between the fifth and seventh levels is large, and it is expected will pay well, as these developments have disclosed the vein both rich and strong. Mr. Andrews leaves on April 2 for Colorado to carry out the details of the amalgamation. Flagstaff, 3 to 3 $\frac{1}{2}$; the latest advices state that the 800-ft. level west, which has been driven by the Burleigh drill, has struck a large body of ore containing a superior percentage of sulphides—a very rich in silver. Mining operations are going on satisfactorily, the result for March up to the 23rd being 63 tons per day, the largest output ever realised during March, by far the worst month of the whole year, operations both underground and by road being at this season seriously retarded by melting snow. It appears that Mr. Hunter has succeeded in purchasing up the remaining interests of South Star and Titus property, the whole being now obtained for the Flagstaff Company for \$36,000. As all reports respecting the South Star and Titus are favourable, this mine is considered from its immediate contiguity to the Flagstaff to constitute an important addition to the latter, especially as from the connection of the two properties they can readily be worked as one mine. The levels of the Flagstaff indeed can, it is said, be extended directly into the South Star and Titus workings.

The market for Hydraulic or Gold Washing Mine Shares has been entirely without animation, and quotations, as given below, are quite nominal. Lead Mines have been very quiet, with a tendency to dullness, uncertainty existing as to how far certain of these properties have been or may be prejudiced by the recent financial embarrassments in the smelting trade. Lisburne, 75 to 80; on Tuesday the directors declared the usual two-monthly dividend. In connection with mining enterprise in Cardiganshire it is announced that the old Egar-Hir and Egar Ffearth Mines, formerly known as the Welsh Potosi and Cardiganshire Consols, are to be re-worked with adequate capital and careful management. Great Laxey, 20 to 22; the directors have decided to declare on April 10 a dividend of 10s. per share for the quarter. Van, 35 to 37; the directors have declared a dividend, payable on April 10, of 16s. per share for the quarter. Van Consols, 2 $\frac{1}{2}$ to 2 $\frac{1}{2}$; all work progressing with regularity. The drawing shaft is being sunk with a full force of men. The company held acceptances of the Barry Port Lead Smelting Company, which were, however, paid at maturity some few days before the failure of that firm. Glyn, 1 $\frac{1}{2}$ to 2; the agent continues sanguine of success as depth is attained. Great West Van; the present shares are said to have been well subscribed for, the directors taking 1780/- out of the total issue of 5000.

Grogwinion, 3 $\frac{1}{2}$ to 4 $\frac{1}{2}$; the fall is owing to the heavy failure in the metal trade, and because the deaths of several large shareholders have caused a considerable number of shares to be offered for sale. The last report from the mine is satisfactory. Wye Valley, 3 $\frac{1}{2}$ to 4 $\frac{1}{2}$; this mine is affected by the failure of the smelting company, and shares are consequently offered at a decline. The latest report from the mine states that prospects have improved at the 22nd east, and that new discoveries may be expected. West Wye Valley, 2 $\frac{1}{2}$ to 3 $\frac{1}{2}$; the report states that good progress is being made in sinking the shaft and driving the levels, "but the lode has not yet resumed its producing qualities." The crusing and dressing machinery is being pushed on as quickly as possible. Red Rock, 1 $\frac{1}{2}$ to 2 $\frac{1}{2}$; the report states that the lode in the bottom level has been cross-cut with good results. Saint Harmon, 3 to 3 $\frac{1}{2}$; fairly good progress is making at this mine. South Cwmystwith, 2 $\frac{1}{2}$ to 3 $\frac{1}{2}$; the lode in the intermediate cross cut has been intersected, and produces good ore.

Penstruthal, 10s. to 12s. 6d.; the mine is still considered to be slowly but surely developing into a good copper mine: 45 tons of ore were sampled this week. Cathedral, 20s. to 30s.; this mine also continues to open up with indications of becoming a good copper mine—30 tons of copper were sampled this week.

Subjoined are the closing quotations:—

Ashton, 14 to 24 $\frac{1}{2}$	Carn Bras, 34 to 36	Devon Great Consols, 3 $\frac{1}{2}$ to 4 $\frac{1}{2}$
Dolton, 35 to 37	East Cardon, 3 $\frac{1}{2}$ to 4 $\frac{1}{2}$	East Van, 75 to 77
Great Laxey, 2 to 22	Great West Van, 4 to 5 $\frac{1}{2}$	Glyn, 1 $\frac{1}{2}$ to 2
Hington Down Consols, 28 to 30	Leadhills, 6 to 6 $\frac{1}{2}$	Hinton, 75 to 125
Mark's, 6 to 17s. 6d.	Mark's Valley, 75 to 125	Parys Mountain, 3 to 12
Pately Bridge, 2 to 3	Pembrey, 34 to 36	Penstruthal, 3 to 3 $\frac{1}{2}$
Pennar, 12 $\frac{1}{2}$ to 12 $\frac{1}{2}$	Tincoff, 18 to 19	Roman Gravels, 12 $\frac{1}{2}$ to 12 $\frac{1}{2}$
Tankerville, 8 to 8 $\frac{1}{2}$	West Ashton, 1 to 1 $\frac{1}{2}$	Tincoff, 17 to 19
West Chilverton, 17 to 19	West Tankerville, 13 to 13 $\frac{1}{2}$	Wheal Crebaw, 2 $\frac{1}{2}$ to 2 $\frac{1}{2}$
West Cwmystwith, 13 to 13 $\frac{1}{2}$	West Ashton, 1 to 1 $\frac{1}{2}$	Wheal Grenville, 1 to 1 $\frac{1}{2}$
Wheal Grenville, 1 to 1 $\frac{1}{2}$	Wheal Tincoff, 1 to 1 $\frac{1}{2}$	Wheal Trelawnyd, 3 to 3 $\frac{1}{2}$
Wheal Tincoff, 3 to 3 $\frac{1}{2}$	Cape Copper, 39 to 41	Wheal Treborth, 2 to 2 $\frac{1}{2}$
Cape Creek, 2 to 2 $\frac{1}{2}$	Cedar Creek, 3 to 4	Wheal Treborth, 2 to 2 $\frac{1}{2}$
Chantocks, 5 to 5 $\frac{1}{2}$	Colorado Terrible, 1 $\frac{1}{2}$ to 1 $\frac{1}{2}$	Condes of Chile, 2 to 2 $\frac{1}{2}$
Colorado Terrible, 1 $\frac{1}{2}$ to 1 $\frac{1}{2}$	Condes of Chile, 2 to 2 $\frac{1}{2}$	Don Pedro, 8s. to 10s.
Condes of Chile, 2 to 2 $\frac{1}{2}$	Condes of Chile, 2 to 2 $\frac{1}{2}$	Ebenezer, 1 $\frac{1}{2}$ to 2 $\frac{1}{2}$
Condes of Chile, 2 to 2 $\frac{1}{2}$	Condes of Chile, 2 to 2 $\frac{1}{2}$	Fernie, 1 $\frac{1}{2}$ to 2 $\frac{1}{2}$
Condes of Chile, 2 to 2 $\frac{1}{2}$	Condes of Chile, 2 to 2 $\frac{1}{2}$	Flagstaff, 2 to 3 $\frac{1}{2}$
Condes of Chile, 2 to 2 $\frac{1}{2}$	Condes of Chile, 2 to 2 $\frac{1}{2}$	Forreston, 1 $\frac{1}{2}$ to 2 $\frac{1}{2}$
Condes of Chile, 2 to 2 $\frac{1}{2}$	Condes of Chile, 2 to 2 $\frac{1}{2}$	Gwynfor, 1 $\frac{1}{2}$ to 2 $\frac{1}{2}$
Condes of Chile, 2 to 2 $\frac{1}{2}$	Condes of Chile, 2 to 2 $\frac{1}{2}$	Java, 34 to 36
Condes of Chile, 2 to 2 $\frac{1}{2}$	Condes of Chile, 2 to 2 $\frac{1}{2}$	Kapanga, 2 $\frac{1}{2}$ to 3 $\frac{1}{2}$
Condes of Chile, 2 to 2 $\frac{1}{2}$	Condes of Chile, 2 to 2 $\frac{1}{2}$	New Pacific, 2 $\frac{1}{2}$ to 3 $\frac{1}{2}$
Condes of Chile, 2 to 2 $\frac{1}{2}$	Condes of Chile, 2 to 2 $\frac{1}{2}$	New Quebec, 4 $\frac{1}{2}$ to 4 $\frac{1}{2}$
Condes of Chile, 2 to 2 $\frac{1}{2}$	Condes of Chile, 2 to 2 $\frac{1}{2}$	Malabar, 3 $\frac{1}{2}$ to 4 $\frac{1}{2}$
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Condes of Chile, 2 to 2 $\frac{1}{2}$	Condes of Chile, 2 to 2 $\frac{1}{2}$	Mapus, 3 $\frac{1}{2}$ to 4 $\frac{1}{2}$
Condes of Chile, 2 to 2 $\frac{1}{2}$	Condes of Chile, 2 to 2 $\frac{1}{2}$	Plumas Eureka, 2 $\frac{1}{2}$ to 3 $\frac{1}{2}$
Condes of Chile, 2 to 2 $\frac{1}{2}$	Condes of Chile, 2 to 2 $\frac{1}{2}$	Richmond Consolidated, 5 $\frac{1}{2}$ to 6 $\frac{1}{2}$
Condes of Chile, 2 to 2 $\frac{1}{2}$	Condes of Chile, 2 to 2 $\frac{1}{2}$	St. John del Rey, 250 to 280
Condes of Chile, 2 to 2 $\frac{1}{2}$	Condes of Chile, 2 to 2 $\frac{1}{2}$	San Pedro, 5 $\frac{1}{2}$ to 7 $\frac{1}{2}$
Condes of Chile, 2 to 2 $\frac{1}{2}$	Condes of Chile, 2 to 2 $\frac{1}{2}$	Sierra Buttes, 1 $\frac{1}{2}$ to 3 $\frac{1}{2}$
Condes of Chile, 2 to 2 $\frac{1}{2}$	Condes of Chile, 2 to 2 $\frac{1}{2}$	South Aurora, 4 $\frac{1}{2}$ to 5 $\frac{1}{2}$
Condes of Chile, 2 to 2 $\frac{1}{2}$	Condes of Chile, 2 to 2 $\frac{1}{2}$	Tecoma, 3 $\frac{1}{2}$ to 4 $\frac{1}{2}$
Condes of Chile, 2 to 2 $\frac{1}{2}$	Condes of Chile, 2 to 2 $\frac{1}{2}$	United Mexican, 2 to 2 $\frac{1}{2}$

COLLIERS.—The slight improvement which was last week noticeable in the coal and iron trades has hardly been maintained, though the prospects for the future are considered in some quarters to be more favourable. In one or two districts some good orders have been obtained for iron, in another for rails which have been obtained from Spain, as a satisfactory feature that a large or for rails has been obtained from Spain, right in the teeth of Belgian competitors. This will, no doubt, have the effect of directing more of foreign attention to our own makers, and is a subject for congratulation. In the Lancashire and Northern districts higher prices are being obtained for small coal, which it is believed will again improve in price next month. This is of little consequence to the colliery masters of those districts, as any advantage obtainable over large coal is generally lost in the necessity of raising the small.

Colliery shares have during the past week met with but little enquiry, and in one or two cases where many shares have been offered prices have receded. This is particularly the case with Wilson and Crump Meadow shares, of which a good many have recently been placed on the market. The price has consequently dropped to 52s. 6d. Newport Alfreton remain as last week at 4 to 4 $\frac{1}{2}$. Cakemore, 2 $\frac{1}{2}$ to 3. New Sharston have been offered and close at 3 $\frac{1}{2}$ to 4 $\frac{1}{2}$. Thorpe Gwbert have also met with but little favour, and have dropped to 1 $\frac{1}{2}$ to 2 $\frac{1}{2}$. Chapel House share remain firm at 3 to 3 $\frac{1}{2}$. The manager, under date March 28, writes:—"The arching and bricking up of 14-foot pit will be completed to-morrow. There will be about a week's work arranging air pipes, getting out arched centres, &c., before we commence to drive into the coal. We expect to commence sinking 15-foot shaft next week." Alltarni share close at 5 to 5 $\frac{1}{2}$. The Brasye coal has been struck in the Lily pit. Llwyd Hill close at 9 to 10. Aldridge Colliery shares close the week at 27 to 27 $\frac{1}{2}$. Cannoch and Huntington, 2 to 2 $\frac{1}{2}$. Hunsdale, 9 $\frac{1}{2}$ to 10 $\frac{1}{2}$. Sandwell Park, 19 $\frac{1}{2}$ to 20 $\frac{1}{2}$. West Cannoch, 15 to 6 $\frac{1}{2}$.

A petition has been presented to the High Court of Justice for the winding-up of the North of England Sulphur Company (Limited).

Vice-Chancellor Sir James Baon has appointed Mr. J. J. Saffery (Messrs. J. J. Saffery and Co.) official liquidator of the Ottoman Company.

The Master of the Rolls has appointed Mr. Alfred A. Broad (Broad, Paterson, and May, accountants, Wakefield), and Mr. Lewis (one of the directors) official liquidators of the Hope's Tel-graph Works (Limited).

The Bury Port Smelting Company, consisting of four partners—A. Thompson, Douglas A. Onslow, Charles H. Woods, and John D. Thompson—has filed a petition for liquidation in the County Court of Carmarthen. It is believed that the difficulties will prove to be considerable, and the failure affects several mining concerns rather seriously. The difficulties of the company have been known for some little time, and efforts were made to tide them over, but they have proved unsuccessful.

Mr. Clemow, of the Birmingham, Dudley, and District Banking Company, has been appointed manager of the North Western Bank, Liverpool.

THURSIS SULPHUR AND COPPER COMPANY.—The directors have resolved to recommend at the annual meeting, to be held on April 19, that a divi-

sion at the rate of 20 per cent. per annum be declared from the profits of the company for the year, and Dec. 31—one half thereof payable on May 10, and the remainder on Nov. 10, both free of income tax; and that the balance of £10,856. 0s. 6d. be carried forward to the year 1877.

WEST WHEAL SETON.—The end in the 15, in the western part of the mine, is daily improving for copper, and yielding 9 tons of rich ore per fathom.

ROOKHOPE.—The stope in the back of the 25 is worth 1 ton per fathom. The stope in the back of the 15 is worth 1 $\frac{1}{2}$ ton per fathom, and another in the same level 25 cwt. per fathom, which latter steps are in ground previously left, only one side of the level having been worked before. Mr. Blenkinson states that the general appearance of the mine was never more promising since he knew it. The 42 is entering into more productive ground, a considerable improvement having taken place in the last 2 or 3 fms. The end is worth 15 cwt. per fathom, with indications of improvement, but is suspended for a short time till the rise to Gin shaft is up 3 or 4 fms., so that the workings may not interfere with each other. The reserves of ore stuff and paying ground laid open have considerably increased, and they will be able to greatly increase the returns as soon as the dressing-floors are ready at the high shaft, which is expected to be within two months.

DERWENT LEAD MINE.—Having repeatedly drawn attention to this important concern, we are pleased to continue to record the favourable progress being made. The manager's full report will be found in the usual column, and shows how well the mine still opens out and improves, while valuable discoveries may be expected any day in the various cross-cuts and other exploratory drivages. We understand that the returns already meet two thirds of the costs, and that the former will be further increased at once, while the quantity of ore ground opened is nearly three times what is taken away every month. The company has a very large balance of working capital, and the mine will soon be in a most satisfactory position.

PRINCE OF WALES.—The winze from the 55 to the 77 is now completed, giving thorough ventilation to the workings, and enabling the levels to be extended westward into new ground. The appearance of the lode at the 55 is all that could be desired for the production of copper, and should the 77 open into ore, as is confidently expected, an entirely new mine will be opened up westward. The lode in the three ends—the 45, 55, and 77—strong and masterly, and exceedingly promising. The development of the mine will be now rapidly prosecuted, and in this district important results may be speedily achieved.

NEW CONSOLS.—The intrinsic value of this property is evidenced by the fact that Messrs. Isaacs, Westlake, J. and H. Pearce, and Spear have been appointed a local committee, and they pledge themselves to act in concert with the London board to promote the welfare of the company by every possible means. Reforms and local economies will be at once carried into effect, and all further outlay stopped.

There seems to be nothing to prevent profits being made, and as the above-named gentlemen reside near the mine and works, are large creditors and shareholders, and wish to promote the success of the company, it would appear that a step has been taken which is well calculated to produce the best results for all parties.

WEST MARIA AND FORTESCUE CHANCERY SUIT.—This suit in Chancery, which originated in a question of compensation for the use of a shaft in West Maria for hauling the ore broken in Wheal Fortescue, and depositing the refuse on the land of West Maria, is now settled. When the Bill in Chancery was filed an incidental question arose as to whether the matter should be decided by the Lord Chancellor or by arbitration, and after a long delay the main question at issue was ultimately referred to arbitration, and the compensation by the company to Messrs. Wileford, the proprietors of West Maria, was fixed by Mr. Cornish, of Penzance. The bill of costs from the solicitor of the company for contesting the single point raised as to whether the main question should be decided by the Court or by arbitration amounted to 444L 15s. 6d., which total has been reduced on taxation to 259L. The expenses attending the decision by Mr. Cornish—the real question in dispute—only amounted altogether to about 30L.

HOLMBUSH.—Another branch of copper, running west from the end lode, has been cut this week, at about 18 in. south of that last met with, and it is considered that the main part of the course of copper is now close at hand, as it is evident that the extreme limit of the veins has been reached.

WHEAL NEWTON.—The reports of the silver discovery continue to be very encouraging. The secretary, after his underground inspection this week, writes to the London agents, as follows:—"The stopes on the silver lode is looking splendid, with large spots of silver plentifully scattered over the lode. We broke some of the finest stones I have yet seen."

THE ALMADA AND TIRITO CONSOLIDATED SILVER MINING COMPANY.—The last advices from Mexico (Feb. 8) relative to this company's mines, which are in this day's Journal, are of much interest. In the Tirito Mine the shaft was then down 37 ft. 6 in. below the 42 fm. level, or about 98 fms. below the surface. The lode was still in the shaft, and the containing rock was a congenial porphyry. There were 22 ft. 6 in. to sink to the 52, on reaching which the ground on each side of the level will be thoroughly explored, and levels driven north and south. The quality of the ore at the lowest level appears to be argentiferous copper, such as can be treated with quicksilver by the Patio process. We are also glad to notice that the Mina Grande Mine is again being worked, that the ore is improving in that mine, and that there is good ground for believing that this ore (black sulphides) can be successfully roasted on the spot and treated with quicksilver by the pan process.

NOTICE OF REMOVAL.

MESSRS. F. W. MANSELL AND CO. (SWORN STOCK AND SHARE BROKERS), have REMOVED to 43 AND 43A, PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.

WANNALEAD MINE.—Particulars of this very valuable Mine will be found in the SIXTH EDITION of Mr. MURCHISON'S work on BRITISH LEAD MINES, published THIS DAY, with Maps, &c., price 2s. 6d. The Prefaces to the Six Editions price 1s. 8d. AUSTINFRIARS, LONDON.

TANKERVILLE, ROMAN GRAVELS, GREAT LAXEY, MINERA, LEADHILLS, DERNWENT.

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"Contains a good deal of information that may be useful at present. Mr. Murchison's theory is briefly that on the average British Lead Mines have less of the lottery element in them than any others, and the figures he gives seem to support that view; at all events, those interested in this industry will find his facts and observations worth reading."—Times.

"Calculated to be a great bet fit to investors."—Mining Journal.

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Flagstaff, 3 to 3 $\frac{1}{2}$; the latest advices state that the 800-ft. level, which has been driven of late by the Barleigh drill, has struck a large body of ore containing a superior percentage of sulphide, exceptionally rich in silver. Mining operations are going on satisfactorily, the result for March up to the 23rd being 63 tons per day—the largest output ever realised during March, by far the worst month of the whole year, operations both underground and by road being at this season seriously retarded by melting snow. It appears that Mr. Hunter has succeeded in purchasing up the remaining interests of South Star and Titus property, the whole being now obtained for the Flagstaff Company for \$36,000. As all reports respecting the South Star and Titus are favourable, this mine is considered from its immediate contiguity to the Flagstaff to constitute an important addition to the latter, especially as from the connection of two properties they can readily be worked as one mine. The lodes of the Flagstaff indeed can, it is said, be extended directly into the South Star and Titus workings.

The market for Hydraulic or Gold Washing Mine Shares has been entirely without animation, and quotations, as given below, are quite nominal. Lead Mines have been very quiet, with a tendency to dullness, uncertainty existing as to how far certain of these properties have been or may be prejudiced by the recent financial embarrassments in the smelting trade. Lisburne, 75 to 80; on Tuesday the directors declared the usual two-monthly dividend. In connection with mining enterprises in Cerdigshire it is announced that the old Esgair-Hir and Esgair Ffearth Mines, formerly known as the Welsh Post and Cardiganshire Consols, are to be re-worked with adequate capital and careful management. Great Lixey, 20 to 22; the directors have decided to declare on April 10 a dividend of 10s. per share for the quarter. Van, 35 to 37; the directors have declared a dividend, payable on April 10, of 16s. per share for the quarter. Van Consols, 2 $\frac{1}{2}$ to 2 $\frac{1}{2}$; all work progressing with regularity. The drawing shaft is being sunk with a full force of men. This company held acceptances of the Barry Port Lead Smelting Company, which were, however, paid at maturity some few days before the failure of that firm. Glyn, 1 $\frac{1}{2}$ to 2; the agent continues sanguine of success as depth is attained. Great West Van; the present shares are said to have been well subscribed for, the directors taking 178000 out of the total issue of 50000.

Grogwinion, 3 $\frac{1}{2}$ to 4 $\frac{1}{2}$; the fall is owing to the heavy failure in the metal trade, and because the deaths of several large shareholders have caused a considerable number of shares to be offered for sale. The last report from the mine is satisfactory. Wye Valley, 3 $\frac{1}{2}$ to 4 $\frac{1}{2}$; this mine is affected by the failure of the smelting company, and shares are consequently offered at a decline. The latest report from the mine states that prospects have improved at the 22 east, and that new discoveries may be expected. West Wye Valley, 2 $\frac{1}{2}$ to 3 $\frac{1}{2}$; the report states that good progress is being made in sinking the shaft and driving the levels, "but the lode has not yet resumed its producing qualities." The crusing and dressing machinery is being pushed on as quickly as possible. Red Rock, 1 $\frac{1}{2}$ to 2 $\frac{1}{2}$; the report states that the lode in the bottom level has been cross-cut with good results. Saint Harmon, 3 to 3 $\frac{1}{2}$; fairly good progress is making at this mine. South Cwmystwyth, 2 $\frac{1}{2}$ to 3 $\frac{1}{2}$; the lode in the intermediate cross-cut has been intersected, and produces good ore.

Penstrithal, 10s. to 12s. 6d.; the mine is still considered to be slowly but surely developing into a good copper mine: 45 tons of copper were sampled this week. Cathedral, 20s. to 30s.; this mine also continues to open up with indications of becoming a good copper mine—30 tons of copper were sampled this week.

Sabden are the closing quotations:—
Assheton, 1 $\frac{1}{2}$ to 2 $\frac{1}{2}$; Carn Brea, 34 to 36; Devon Great Consols, 3 $\frac{1}{2}$ to 4 $\frac{1}{2}$; Bolsover, 3 to 3 $\frac{1}{2}$; East Cardon, 3 $\frac{1}{2}$ to 4; East Van, 7 $\frac{1}{2}$ to 7 $\frac{1}{2}$; Glyn, 1 $\frac{1}{2}$ to 2 $\frac{1}{2}$; Great Lixey, 2 to 2 $\frac{1}{2}$; Great West Van, 3 $\frac{1}{2}$ to 4 $\frac{1}{2}$; Hindostown Down Consols, 12s. 6d. to 17s. 6d.; Leadhills, 6 to 6 $\frac{1}{2}$; Marke Valley, 7 $\frac{1}{2}$ to 1 $\frac{1}{2}$; Parys Mountain, 3 to 3 $\frac{1}{2}$; Pateley Bridge, 2 to 3; Penney, 12 to 1 $\frac{1}{2}$; Penstrithal, 3 to 4 $\frac{1}{2}$; Roman Gravels, 12 $\frac{1}{2}$ to 12 $\frac{1}{2}$; Tankerville, 8 to 8 $\frac{1}{2}$; Tincroft, 18 to 19; Van, 3 to 3 $\frac{1}{2}$; Van Consols, 2 to 2 $\frac{1}{2}$; West Assheton, 1 to 1 $\frac{1}{2}$; West Bassett, 4 to 4 $\frac{1}{2}$; West Chiverton, 17 to 19; West Tankerville, 1 $\frac{1}{2}$ to 1 $\frac{1}{2}$; Wheat Crober, 2 $\frac{1}{2}$ to 2 $\frac{1}{2}$; Wheat Gravel, 11 to 12; Almada and Tiro, 3 to 4 $\frac{1}{2}$; Argentine, 5 to 5 $\frac{1}{2}$; Birlesley Creek, 5 to 5 $\frac{1}{2}$; Chantales, 4 to 4 $\frac{1}{2}$; Colorado Terrible, 1 $\frac{1}{2}$ to 1 $\frac{1}{2}$; Condes de Chilli, 4 to 5 $\frac{1}{2}$; Don Pedro, 8s. to 10s.; Eborhardt, 6 to 6 $\frac{1}{2}$; Emma, 3 to 3 $\frac{1}{2}$; Exchequer, 1 to 2 $\frac{1}{2}$; I.X.L., 1 1/16th to 1 3/16ths; Flagstaff, 3 to 3 $\frac{1}{2}$; Frontino and Bolivia, 1 $\frac{1}{2}$ to 1 $\frac{1}{2}$; Javalli, 3 to 3 $\frac{1}{2}$; Kapanga, 2 $\frac{1}{2}$ to 2 $\frac{1}{2}$; Last Chance, 3 to 3 $\frac{1}{2}$; Malpaso, 3 to 3 $\frac{1}{2}$; Malabar, 3 to 3 $\frac{1}{2}$; New Pacific, 3 to 3 $\frac{1}{2}$; New Quebec, 4 to 4 $\frac{1}{2}$; Pestanca, 3 to 3 $\frac{1}{2}$; Plumas Eureka, 2 $\frac{1}{2}$ to 2 $\frac{1}{2}$; Rio, 3 to 3 $\frac{1}{2}$; Richmond Consolidated, 5 to 5 $\frac{1}{2}$; St. John del Rey, 250 to 260; San Pedro, 5 to 5 $\frac{1}{2}$; Sierra Buttes, 1 $\frac{1}{2}$ to 1 $\frac{1}{2}$; South Aurora, 3 to 3 $\frac{1}{2}$; Teconas, 3 to 3 $\frac{1}{2}$; United Mexican, 2 to 2 $\frac{1}{2}$.

COLLIERS.—The slight improvement which was last week noticeable in the coal and iron trades has hardly been maintained, though the prospects for the future are considered in some quarters to be more favourable. In one or two districts some good orders have been obtained for iron, and where iron shipbuilding is mostly carried on there are not so many complaints of the state of trade. We notice, too, as a satisfactory feature that a large or for ferric has been obtained from Spain, right in the teeth of Belgian competitors. This will, no doubt, have the effect of directing more foreign attention to our own makers, and is a subject for congratulation. In the Lancashire and Northern districts higher prices are being obtained for small coal, which it is believed will again improve in price next month. This is of some little consequence to the colliery masters of those districts, as any advantage obtainable over large coal is generally lost in the necessity of raising the small.

Colliery shares have during the past week met with but little enquiry, and in one or two cases, where many shares have been offered, prices have received. This is particularly the case with Bilson and Crump Meadow shares, of which a good many have recently been placed on the market. The price has consequently dropped to 5%, 6%. Newport Aberraville remain as last week at 4 to 4 $\frac{1}{2}$. Cakemore, 2 $\frac{1}{2}$ to 3. New Sharston have been offered and close at 3 $\frac{1}{2}$ to 4 $\frac{1}{2}$. Chapel House shares remain at 3 to 3 $\frac{1}{2}$. The manager, under date March 28, writes—"The arching and bricking up of 16-ft. pit will be completed to-morrow. There will be about a week's work arranging air pipes, getting out arching centres, &c., before we commence to drive into the coal. We expect to commence sinking 15-ft. shaft next week." Allardt shares close at 5 to 5 $\frac{1}{2}$. The Brassy coal has been struck in the Lily pit. Lay Hall close at 9 to 10. Allridge Colliery shares close the week at 2 to 2 $\frac{1}{2}$. Cannock and Huntington, 2 to 2 $\frac{1}{2}$. Hamstead, 9 to 10 $\frac{1}{2}$. Sandwell Park, 19 to 20%. West Cannock, 19 to 20%. West Cannock, 19 to 20%.

A petition has been presented to the High Court of Justice for the winding-up of the North of England Sulphur Company (Limited). Vice-Chancellor Sir James Baile has appointed Mr. J. J. Saffery (Messrs. J. J. Saffery and Co.) official liquidator of the Ottoman Company.

The Master of the Rolls has appointed Mr. Alfred A. Broad (Broad, Paterson, and May, accountants, Wabrook), and Mr. Lewis (one of the directors) official liquidators of Hopper's Telegraph Works (Limited).

The Bur. of Port Smelting Company, consisting of four partners—Astle Thompson, Douglas A. Gistow, Charles H. Woods, and John D. Thompson—has filed a petition for liquidation in the County Court of Carmarthen. It is believed that the liquidators will prove to be considerable, and the failure affects several mining concerns rather seriously. The difficulties of the company may have been known for some little time, and efforts were made to tide them over, but they have proved

small at the rate of 20 per cent. per annum being declared from the profits of the company for the year end Dec. 31—one half thereof payable on May 1, and the remainder on Nov. 10, both free of income tax; and that the balance of 10,858l. 0s. 8d. be carried forward to the year 1877.

WEST WHEAL SETON.—The end in the 15, in the western part of the mine, is daily improving for copper, and yielding 9 tons of rich ore per fathom.

ROOKHOPE.—The stope in the back of the 25 is worth 1 ton per fathom. The stope in the back of the 15 is worth 1 $\frac{1}{2}$ ton per fathom, and another in the same level 25 cwt. per fathom, which latter spaces are in ground previously left, only one side of the level having been worked before. Mr. Blenkiron states that the general appearance of the mine was never more promising since he knew it. The 42 is entering into more productive ground, a considerable improvement having taken place in the last 2 or 3 fms. The end is worth 15 cwt. per fathom, with indications of improvement, but is suspended for a short time till the rise to Gin shaft is up 3 or 4 fms., so that the workings may not interfere with each other. The reserves of ore stuff and paying ground laid open have considerably increased, and they will be able to greatly increase the returns as soon as the dressing-floors are ready at the high shaft, which is expected to be within two months.

DERWENT LEAD MINE.—Having repeatedly drawn attention to this important concern, we are pleased to continue to record the favourable progress being made. The manager's full report will be found in the usual column, and shows how well the mine still opens out and improves, while valuable discoveries may be expected any day in the various cross-cuts and other exploratory drivings. We understand that the returns already meet two thirds of the costs, and that the former will be further increased at once, while the quantity of ore ground opened is nearly three times what is taken away every month. The company has a very large balance of working capital, and the mine will soon be in a most satisfactory position.

PRINCE OF WALES.—The winze from the 55 to the 77 is now completed, giving thorough ventilation to the workings, and enabling the levels to be extended westward into new ground. The appearance of the lode at the 55 is all that could be desired for the production of copper, and should the 77 open into ore, as is confidently expected, an entirely new mine will be opened up westward. The lode in the three ends—the 45, 55, and 77—strong and masterly, and exceedingly promising. The development of the mine will be now rapidly prosecuted, and in this district important results may be speedily achieved.

NEW CONSOLS.—The intrinsic value of this property is evidenced by the fact that Messrs. Isaacs, Westlake, J. and H. Pearce, and Spear have been appointed a local committee, and they pledge themselves to act in concert with the London board to promote the welfare of the company by every possible means. Reform and local economy will be at once carried into effect, and all further outlay stopped. There seems to be nothing to prevent profits being made, and as the above-named gentlemen reside near the mine and works, are large creditors and shareholders, and wish to promote the success of the company, it would appear that a step has been taken which is well calculated to produce the best results for all parties.

WEST MARIA AND FORTESCUE CHANCERY SUIT.—This suit in Chancery, which originated in a question of compensation for the use of a shaft in West Maria for hauling the ore broken in Wheal Fortescue, and depositing the refuse on the land of West Maria, is now settled. When the Bill in Chancery was filed an incidental question arose as to whether the matter should be decided by the Lord Chancellor or by arbitration, and after a long delay the main question at issue was ultimately referred to arbitration, and the compensation by the company to Messrs. Wilesford, the proprietors of West Maria, was fixed by Mr. Cornish, of Penzance. The bill of costs from the solicitor of the company for contesting the single point raised as to whether the main question should be decided by the Court or by arbitration amounted to 444l. 10s. 6d., which total has been reduced on taxation to 250l. The expenses attending the decision by Mr. Cornish—the real question in dispute—only amounted altogether to about 30l.

HOLMBUSH.—Another branch of copper, running west from the lead lode, has been cut this week, at about 18 in. south of that last met with, and it is considered that the main part of the course of copper is now close at hand, as it is evident that the extreme limit of the heave has been reached.

WHEAL NEWTON.—The reports of the silver discovery continue to be very encouraging. The secretary, after his underground inspection this week, writes to the London agents, as follows:—"The stope on the silver lode is looking splendid, with large spots of silver plentifully scattered over the lode. We broke some of the finest stones I have yet seen."

THE ALMADA AND TIRITO CONSOLIDATED SILVER MINING COMPANY.—The last advices from Mexico (Feb. 8) relative to this company's mines, which are in this day's Journal, are of much interest. In the Tirito Mine the shaft was then down 37 ft. 6 in. below the 42 fm. level, or about 98 fms. below the surface. The lode was still in the shaft, and the containing rock was a congenital porphyry. There were 22 ft. 6 in. to sink to the 52, on reaching which the ground on each side of the level will be thoroughly explored, and levels driven north and south. The quality of the ore at the lowest level appears to be argentiferous copper, such as can be treated with quicksilver by the Patio process. We are also glad to notice that the Mina Grande Mine is again being worked, that the ore is improving in that mine, and that there is good ground for believing that this ore (black sulphides) can be successfully roasted on the spot and treated with quicksilver by the pan process.

NOTICE OF REMOVAL.

MESSRS. F. W. MANSELL AND CO. (SWORN STOCK AND SHARE BROKERS), have REMOVED to 43 AND 43A, PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.

V A N L E A D M I N E .—Particulars of this very valuable Mine will be found in the SIXTH EDITION of Mr. MURCHISON'S work on BRITISH LEAD MINES, published THIS DAY, with Maps, &c., price 2s. 6d. The Prefaces to the Six Editions price 1s. 8d. AUSTINFIARS, LONDON.

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GREAT LAXEY.
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FULL PARTICULARS of the above and other valuable LEAD MINES will be found in the SIXTH EDITION of Mr. MURCHISON'S work on BRITISH LEAD MINES, published THIS DAY, with Maps, &c., 2s. 6d. The Prefaces to the Six Editions, 1s.

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"Contains a good deal of information that may be useful at present. Mr. Murchison's theory is briefly that on the average British Lead Mines have less of the lottery element in them than any others, and the figures he gives seem to support that view; at all events, those interested in this industry will find his facts and observations worth reading."—Times.

"Calculated to be a great benefit to investors."—Mining Journal.

"We have great pleasure in recommending his treatise."—Morning Post.

"We invite capitalists to look into this means of investment."—Money Market Review.

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A MONGST the DIVIDEND-PAYING MINES of CORNWALL the ESPECIAL ATTENTION of INVESTORS is MERITED by HOLMBUSH, which is now making returns of 30 per cent. per annum, with extensive reserves already accumulated, and excellent prospects of further rich discoveries. The present price of the £1 shares is 27s. 6d. Orders to purchase will be executed by Mr. R. DOOME, 150, Palmerston Buildings, Bishopsgate-street, London, E.C., from whom a descriptive pamphlet may be obtained free of charge.

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Has 24 years' experience in Mining and Smelting, and 10 years' experience in American Business and Law, offers his services at moderate charges for Reporting on Mining and other Property in any of the above-named States or Territories; gives correct, safe, and responsible advice as to securing full titles and possessions; and, as to best mode of utilising the property, will advise in settling existing difficulties by compromise, and in disposing of developed mining property when held at real value; offers his assistance for securing undeveloped mining properties at home prices. As to care taken in reporting, reference is made to the *Mining Journal*, Supplement, April 1, 1876, containing report on property of the Maxwell Land Grant and Railway Company; as to technical standing, to the prominent men of the trade—compare *Mining Journal* of Aug. 31 and Nov. 31

NOTICES TO CORRESPONDENTS.

* Such inconvenience having arisen in consequence of several of the Numbers during the past year being out of print, we recommend that the Journal should be filed on receipt; it then forms an accumulating useful work of reference.

LADYWELL.—As a shareholder in this mine I am anxious to know what is being done towards its development? It is now a considerable time since the debentures were subscribed for with this object, but, so far as one can judge from the very meagre reports furnished to the Journal, there does not appear to be much progress made either in deepening or exploring. Sometime since there appeared to be vigorous operations on trial pits, &c., but latterly the operations appear to be confined to driving the 32 fathoms level. I hope the management are not forgetting the axiom that "Time is money."—W. M. D.

WHEEL WHISPER.—Can any reader give some information as to the above unobtrusive little specimen of underground adventure? Have the disastrous floods of the year washed everything away? It has long ceased to say anything of itself through the medium of the Journal, but it seems hardly possible that it can have become totally extinguished without some kind of obituary notice. For some time it exhibited signs of vitality, but I really do not like such long spells of silence.—INQUIRER.

BAMPFYLDE MINING COMPANY.—A few years ago I bought some shares in this mine at a handsome premium. Of course I was a novice at underground ventures, or I should not have so easily parted with my money. At the same time, until very recently there has been something or other to enable us to keep our courage up. You have generally had some report from the captain, and what with the operations of men and boys multiplied together it has seemed as if some hard stuff must sooner or later find its way to market. Moreover, I have had circulars giving a most glowing description of what is going to happen, and offering me shares at a price only four times as much as the quotations in some of your advertisements. These things would all be very encouraging if only the carters would do their duty, and move some of that "20,000 tons of iron ore ready to be sent away" into some part of the country where it might be converted into dividends. As captain's reports seem to have temporarily ceased I am consoling myself with the idea that the miners have been crowded out, and have changed their occupation into that of mineral carriers. Is it so, Mr. SECRETARY?—JOE.

SOUTH CONDUITROW.—I see by the Journal of Saturday that the above mine is making rapid progress, and that a 10s. dividend is anticipated next time. This is good news for the shareholders so far; but how is it that the shares stand at so low a figure?—A SHAREHOLDER: Belfast, March 27.

RECEIPT STAMPS—"X. K." (Holloway).—There can be no question in the matter. A stamped receipt should be given whenever the payment is £2. or upwards, and whether the amount be paid by cheque, Post Office order, or otherwise. No respectable broker would send a mere acknowledgement unstamped, nor would any man of business accept such an acknowledgment. The stamp is only 1d. for any amount, and it is doubtful whether any court of law would recognise an un-stamped receipt in case of subsequent dispute.

ASSAYER—"E. W." (Camberwell).—A youth of ordinary intelligence could master the principles of assaying in twelve months; but, if he be as careless generally as he has been in writing his letter of enquiry, he had better not attempt assaying, as his results would never be worth the paper upon which they might be recorded. The fees payable to the tutor would depend upon his reputation and other circumstances.

MINING JOURNAL—"J. P." (Southport).—The Journal should throughout the kingdom be received with the earliest Saturday morning's London papers; and "J. P." and every other subscriber will confer a great favour on the proprietors by complaining whenever and every time they do not so receive it, as the delay can only be through neglect, which should be remedied. The subscription is £1. 4s. for all parts of Great Britain and Ireland.

RECEIVED—"J. W. B."—"N. R."—"Shareholder" (Anerley).—We shall give a report of the proceedings; but you should attend the meeting, and obtain the information you require. Such particulars are never explained to anonymous correspondents—"Engineer" (Lee's): We will endeavour to give an article on the subject in a week or two—"Subscriber" (Elgin): Write to the broker who sold you the shares; he will procure the information—"Shareholder" (Wheaton-Grenville)—"Shareholder" (Wheaton-Peevor): We could not publish such a letter—"Passenger" (District Railway)—"X. Z."—"J. H. T." (Halifax)—"Correspondent" (Neath)—T. J. Barnard.

THE MINING JOURNAL,
Railway and Commercial Gazette.

LONDON, MARCH 31, 1877.

THE COAL FIELDS OF THE WORLD.

In the inaugural address of Dr. C. W. SIEMENS, delivered before the Iron and Steel Institute, special attention was drawn to the coal areas and annual production of the globe. In the able and eloquent address he alluded to the great value as an important industrial agent was coal, and the distribution of it throughout the world. We are not aware of the sources from which he derived his information as to the area of fuel in different countries, but whilst looking into the matter we have found that he is very far below the mark in the table he has given of the total area of the discovered coal fields of the world. Seeing that the subject is one of great importance, and that any reliable information on the subject will be acceptable to Dr. SIEMENS as well as others, we purpose giving a few facts with respect to certain coal fields that may be worth remembering. Dr. SIEMENS gives the area of the various countries and production in 1874, as follows:—

	Area in square miles.	Production in 1874—tons.
Great Britain	11,900	125,070,000
Germany	1,800	45,658,000
United States	192,000	50,000,000
France	1,800	17,060,000
Belgium	900	14,670,000
Austria	1,800	12,280,000
Russia	11,000	1,392,000
Nova Scotia	18,000	1,052,000
Spain	3,000	580,000
Other countries	28,000	5,000,000
Total	270,200	274,262,000

It will be seen that the coal field of Russia is put down at 11,000 square miles, the same as is given by Mr. HULL as the area of the basin between the Dnieper and the Don, north of the Sea of Azof, and considered by Sir R. MURCHISON "to be by far the most valuable in Russia," who also stated that the coal field of Russia was of "enormous area." However, in 1875, a *résumé* of a report on the bituminous coal field of Ekaterinoslav was published, the area of which was estimated at 30,000 square miles (Report for Her Majesty's Consuls). There are also several other vast fields in different parts of Russia, so that the 11,000 square miles is probably not one-fifth of the entire coal area of that country.

In Sweden (coal series of Seana) there are vast deposits of coal, scarcely any notice of which is to be met with in our works on mining. In the work "Ur var tids Forskning," part I., 2nd edition, published at Stockholm, it is stated that the classic coal field extends over many hundred Swedish square miles (one square mile Swedish equal about 36 English). The coal-bearing beds lie upon red sandstones and clays, probably triassic. The seams are not much worked, but are capable of being extensively wrought. The coal contains little or no sulphur, and is a good house and gas coal. Here we have an area of thousands of square miles of coal almost unknown and entirely unnoticed.

If we go to Australia there we find the coal area something immense. In New South Wales the Rev. W. B. CLARKE, F.R.S., in evidence before a Committee of the Legislative Council, said that he had then obtained acquaintance with the existence of carboniferous formations over from 17,000 to 18,000 square miles on the eastern side of the colony, but from information received from other explorers the territory was of greater importance than he then supposed. In Queensland the same authority states to the northward of the Canningham the carboniferous formation extends over vast regions in which coal undoubtedly exists. He calculates that on the M'Kenzie it occupies an extent of 40,000 square miles, whilst the country between the Canningham and the parallel of 32° occupied by similar beds cannot be less than 15,000 square miles. "Taking into account the fact," says Mr. CLARKE, "stated by Sir T. L. MITCHELL in his history of the explorations of the far interior, and the existence of the same carboniferous formations in various parts of the littoral districts of Victoria, but as far as the Grampian Mountains westward of the 143rd meridian it becomes manifest that there is no country on the globe, America excepted, occupied to so large an extent by these formations as Australia, and with trifling exceptions nearly all this enormous area occupied by these carboniferous beds belongs to New South Wales and Queensland." The coal is worked in many parts of Australia, as well as in New Zealand.

In China, too, we are told by Baron VON RICHTHOVEN that the provinces of Honan and Shansi are richly stored with coal and

iron, the extent being considerably greater than that of Pennsylvania. It will, therefore, be evident that the extent of our known coal fields is greatly in excess of 270,200 square miles, for Russia alone must contain something approaching one-fourth of that area, whilst other countries which we have alluded to, but not named in the address, will take credit for a great deal more. These remarks have not been made in a critical spirit, for the address is in every way above that, but to show that our known coal fields are far greater in extent than is generally supposed.

THE EXPLOSIVES ACT, 1875.

The difficulties attending this Act of Parliament, and the way in which its provisions are being carried out, are attracting the serious attention not only of the manufacturers and dealers in explosives, but of the mining and shipping interests. Several questions have already been asked in Parliament by Mr. MACLAGAN, M.P., to elicit information preparatory to further steps being taken, and we understand that the President of the Board of Trade has consented to receive a deputation from shipowners and shipping brokers to enable them to point out some of the difficulties to which they are exposed by the absurd regulations and restrictions now in force, and that an association is being formed consisting of several influential Members of Parliament, and the leading manufacturers of gunpowder and other explosives, and mineowners, to expose the difficulties thrown in the way of obtaining explosives under the restrictions now imposed.

We lately pointed out the absurdity of the Leith Harbour bye-laws, which require that gunpowder and other explosives intended for shipment shall be brought on to the pier in a railway van drawn by a horse shod in magazine shoes, and that the pier shall be covered with wadmill tilts, hides, or other soft material, the whole to be covered with a woolen cloth or carpet, and to be well soused with water both before and after any shipment takes place, and also that all the persons employed by the harbour master and shippers are to be dressed in clothes without pockets, under the penalty of the whole of the goods belonging to the shipper being confiscated, in addition to his being fined 20*l.* We now understand that the attention of the Leith Harbour authorities having been thus prominently drawn to the absurdity of these regulations they deny the paternity of them, and allege that they emanated from the Board of Trade, or rather from the suggestion of certain officials at the Home Office, to whom it is understood that all matters relating to the Explosives Act are referred, and while they admit the ridiculous character of these provisions they assert that they were insisted on by higher authorities as the only condition on which any bye-laws would be sanctioned as required by the Act. Whether this is so or not may possibly be elicited as further enquiries are pressed in Parliament.

From the answers already obtained by Mr. MACLAGAN from the President of the Board of Trade it appears that bye-laws for the port of the proceedings; but you should attend the meeting, and obtain the information you require. Such particulars are never explained to anonymous correspondents—"Engineer" (Lee's): We will endeavour to give an article on the subject in a week or two—"Subscriber" (Elgin): Write to the broker who sold you the shares; he will procure the information—"Shareholder" (Wheaton-Grenville)—"Shareholder" (Wheaton-Peevor): We could not publish such a letter—"Passenger" (District Railway)—"X. Z."—"J. H. T." (Halifax)—"Correspondent" (Neath)—T. J. Barnard.

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Proceedings will be taken against the officials connected with both collieries before the magistrates, and not, as Mr. MACDONALD appears to have wished, under the 32nd clause of the Mines Regulation Act, which gives the Secretary of State for the Home Department power to cause an enquiry into the conduct of any manager to be made, and after receiving a report containing a full statement of the case to cancel or suspend the certificate in case of unfitness. We certainly think that the ordinary tribunals of the country will be sufficient to deal with the parties implicated, and be equally as satisfactory to the public as leaving the matter to be dealt with by a Committee of Enquiry appointed by the Secretary of State.

the fireman was applying a light to a fuse. Of this state of things the managers were in entire ignorance, although it is undeniably their duty to see that the Act of Parliament and the rules were fully carried out, as well as to appoint competent and trustworthy persons to act as overmen or deputies. In this chaotic state of affairs, when the most dangerous operations in a colliery were left to be carried out by any person, it is no wonder that an explosion took place, resulting in the loss of a number of lives. The actual cause was the same as that which led to the explosion at the Oaks Colliery, when 360 lives were lost. A shot was prepared, the fuse lighted, but it did not go off, but was blown out. Where a shot does not go off the safest plan is to let a new hole be bored, and a fresh charge of powder used.

But explosions take place by stemming or tamping, probably from the high temperature given to the small quantity of air remaining in the particles of powder and about the charge. It is also evident that at the time the shot was blown out there must have been a considerable accumulation of gas, so the probability is that the place was not examined, for the general rule distinctly states that before firing a shot it shall have been found safe to do so by the person appointed to see to the firing of the shot. We are, therefore, not surprised to find the Tyldesley jury returning a verdict to the effect that the managers were all to blame for not providing a sufficient staff of men to carry on the works according to the Act of Parliament. But the blame cannot altogether rest with them, seeing that they employ deputies whom they consider reliable, and those in whose hands they place the carrying out of certain dangerous work. Managers cannot be at the surface and in the workings at the same time, and so long as they engage a sufficient staff to carry on the work they are comparatively blameless in the event of an accident. But the jury considered that the staff was not sufficient; but what might be considered sufficient by one practical man might be thought quite the reverse by another one. Of this, however, we shall hear more hereafter, seeing that there will be an enquiry in a different court, and it is not for us to anticipate the decision that will be come to when the whole case is investigated before the magistrates.

With respect to the Weig Fach Colliery, near to Swansea, 18 lives were lost owing to an explosion of gas. This, it appears, was caused by the deputies not properly reporting the state of the workings, and allowing men to go into places where there was gas. This is a very serious offence, and one for which no excuse can be pleaded. It shows the necessity, which we have often urged, of appointing men to such responsible positions who had been found to be fully qualified for them, being practical, steady, and trustworthy, which they certainly are not always. But what makes this case worse is that the manager, when under examination, admitted his knowledge of gas being in the mine. For this very serious breach we cannot see how there can be any tangible excuse. We should certainly blame an ordinary miner under such circumstances, but when it is a manager who is guilty of such conduct there can be scarcely any palliation for the offence.

Proceedings will be taken against the officials connected with both collieries before the magistrates, and not, as Mr. MACDONALD appears to have wished, under the 32nd clause of the Mines Regulation Act, which gives the Secretary of State for the Home Department power to cause an enquiry into the conduct of any manager to be made, and after receiving a report containing a full statement of the case to cancel or suspend the certificate in case of unfitness. We certainly think that the ordinary tribunals of the country will be sufficient to deal with the parties implicated, and be equally as satisfactory to the public as leaving the matter to be dealt with by a Committee of Enquiry appointed by the Secretary of State.

THE IRON AND STEEL INSTITUTE.

The successful progress of this society continues unabated, and the annual meeting held last week, when the presidential chair passed into the possession of Dr. C. W. SIEMENS, F.R.S., was certainly the most successful in the history of the Institute. Although the absence of abstracts of the papers usually supplied has resulted in great injustice to the readers of the papers in depriving them of the advantage of an accurate report of their views and proposals the neglect to supply them was as far as possible remedied by the President requesting the several authors to give the meaning of their communications without wading through the minute details. It may be hoped that on future occasions the same ground for complaint will not exist, since the result must inevitably be to diminish to a prejudicial extent the number of useful practical papers brought before the members—for it is beyond question that the sole object of reading papers before such societies is to make their contents as widely known as possible, with a view to direct or indirect commercial advantage. Another ingenious method of economising time introduced by the new President was that of discussing all similar papers under one head, so that twice traversing the same ground was avoided, and improved results secured. The vacancy caused by the lamented death of Mr. DAVID FORBES, the first foreign secretary of the Institute, has been admirably filled in appointing Mr. JULIEN DEBY, who although a foreigner speaks English with the utmost purity and fluency, whilst his long connection with and experience of the iron and steel trades will ensure the proper representation of the Institute amongst the ironmasters of the Continent more completely than could have been hoped for from any other selection. The retiring president, Mr. W. MENELAS, in installing his successor, congratulated the members that they now numbered nearly 1000, and expressed the hope that Dr. SIEMENS of office would carry them far above that number.

The inaugural address was startling and interesting, though not entirely free from the dreaminess apparently inseparable from scientific research in that land where "they prove by rule and level straight if bread and butter wanteth weight; and learn to tell the time of day, the clock doth strike by algebray." Dr. SIEMENS defined fuel in the widest acceptance of the word, as comprising all potential force which we may call into requisition for effecting our purposes of heating and working the materials with which we have to deal. He adopted the theory of coal being derived from the sun, and likewise showed that credit was due to that luminary by evaporating sea water and returning it as rain for all the water-power derived from rivers. He showed that the total area of discovered coal in the world was 270,000 square miles, and that the production in 1874 was more than 271,000,000 tons. The unwrought coal amounts to 145,880,000,000, which at the present rate of consumption would last 1100 years, or, assuming the increase of the last 20 years to continue, there would still be 250 years supply. But coal is likely to become quite a drug in the market, for Dr. SIEMENS points out that by utilising a few little cataracts, like the Falls of Niagara, a considerable horse-power could be made available. Taking only Niagara, the principal fall alone possesses a force equal to 16,800,000 horse-power, the consumption of coal in producing which by steam, allowing 4 lbs. per horse-power per hour, would require 265,000,000 tons of coal per annum. He conceives turbines and water-wheels supplied by canals cut along the edges of the stream which supplies the falls, and he would use this water-power to give motion to a dynamo electrical machine, the current from which carried through a metallic conductor is to impart motion to electro-magnetic engines, to ignite the carbon points of electric lamps, or to effect the separation of metals from their combinations. The Niagara Town-Lighting Company, which he foresees would probably secure but little capital from other members of the Iron and Steel Institute, and even many of these will have too vivid a recollection of the Electric Power, Light, and Colour Company, the Lime Light Company, and other projects for using high-power lights, to be inclined to give their support. The suggestion to provide an applied science building as a companion to the pure science building which Burlington House represents, has before been made and rejected as commercially unattractive; but if Dr. SIEMENS can change the feeling with regard to it he will entitle himself to the best thanks of the society over which he presides.

As we have seen, the iron trade is now a very important industry, and the first Australian iron works was established in 1855, and it was not until 1860 that the first blast furnace was erected. The first blast furnace was erected in 1860, and it was not until 1865 that the first blast furnace was erected. The first blast furnace was erected in 1865, and it was not until 1870 that the first blast furnace was erected. The first blast furnace was erected in 1870, and it was not until 1875 that the first blast furnace was erected. The first blast furnace was erected in 1875, and it was not until 1880 that the first blast furnace was erected. The first blast furnace was erected in 1880, and it was not until 1885 that the first blast furnace was erected. The first blast furnace was erected in 1885, and it was not until 1890 that the first blast furnace was erected. The first blast furnace was erected in 1890, and it was not until 1895 that the first blast furnace was erected. 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The first blast furnace was erected in 2055, and it was not until 2060 that the first blast furnace was erected. The first blast furnace was erected in 2060, and it was not until 2065 that the first blast furnace was erected. The first blast furnace was erected in 2065, and it was not until 2070 that the first blast furnace was erected. The first blast furnace was erected in 2070, and it was not until 2075 that the first blast furnace was erected. The first blast furnace was erected in 2075, and it was not until 2080 that the first blast furnace was erected. The first blast furnace was erected in 2080, and it was not until 208

confirming the fact that silicon in iron and steel improves the soundness of the casting, and in reasonable quantities does not materially diminish the strength. Mr. RILEY's observations on the determination of manganese in spiegelzisen and in iron ores are well worthy of consideration, more especially from the importance to the metallurgist of knowing not only how much of a given ingredient he is using, but also of being sure that he is not unintentionally jeopardising his results by introducing impurities whose very existence he is unaware of. In the course of the meeting some interesting remarks were made upon the principles which ensured good welding; this appeared to be the production of such a flux as shall be readily squeezed out in making the weld, the object being to avoid the retention of the oxide of iron formed by the heat. That absolute contact of the clean surfaces of metal is sufficient to ensure a good weld was proved by filing the surfaces of two pieces to be welded, binding them with wire, luting, heating, and hammering—the weld was invisible. Mr. BELL's paper on the separation of carbon, phosphorus, silicon, and sulphur from iron was invaluable. He showed amongst other things that if the carbon be removed too rapidly the iron comes to nature before the other impurities can be got rid of, and a hard unsatisfactory iron is the result. He had also found it best to melt the iron before introducing it into the puddling furnace, as the iron was better, and only one-half of the phosphorus remained in the iron. In the same metal melted cold there remained 0.328 of phosphorus, and melted hot 0.209. In melting the silicon is removed first, then the phosphorus, and last the carbon, and at the end of the process care is necessary to prevent the iron re-taking phosphorus from the slag. The conclusion of the meeting is reported in to-day's Journal, and to this reference for details must be made.

THE COPPER TRADE.

During the quarter ending March 31 the quantity of copper ore, the produce of Cornwall and Devonshire, sold at the Cornish Ticketings, was 13,407 tons, which contained 898 tons 14 cwt., fine copper, and realised 56,354 £. 9s., being equal to an average of 4£. 4s. 1d. per ton of ore, and 62.14s. per ton of copper in the ore. During the same period the British, colonial, and foreign ores sold at Swansea amounted to 10,191 tons, which contained 1513 tons 1 cwt., of fine copper, and realised 109,889 £. 7s., being equal to an average of 10£. 15s. 8d. per ton of ore, and 62.12s. 6d. per ton of copper in the ore. The average produce of the ore sold at the Cornish Ticketings was 6 11-16 per cent., whilst that sold at Swansea gave an average produce of 14 15-16 per cent. From this it will be seen that the aggregate sales by ticket were 23,598 tons of ore, containing 2411 tons 15 cwt., of fine copper, and realising 166,234 £. 16s. The subjoined is a summary of the periodical sales at the Cornwall and Swansea Ticketings respectively. The ores sold at the Cornwall Ticketings were—

Date.	Standard Prod.	Price.	Per unit.	Tons.	Fine cop.	Amount.
Jan. 4.	2,013	9 0 ... 7	£24	9 0 ... 12s.	8 1/2d.	1,430 ... 997,106c. £ 6,333 18 0
18.	104 19 0 ... 62 1/2	4 1 6 ... 12	5 1/2	3698	241	8 ... 15,061 5 6
Feb. 1.	99 19 0 ... 72 1/2	5 2 6 ... 13	0	1224	95	0 ... 6,272 18 6
22.	103 2 0 ... 62 1/2	3 19 0 ... 12	6	2694	169	17 ... 10,699 6 0
Mar. 8.	101 9 0 ... 62 1/2	4 5 0 ... 12	4	1336	92	6 ... 5,692 18 6
22.	103 19 0 ... 62 1/2	4 2 0 ... 12	5	3025	159	4 ... 12,334 2 6
Total for the quarter				13,407	898	14 £256,354 9 0
Quarter ending December, 1876				14,129	943	9 ... 61,079 0 6
Quarter ending September, 1876				14,075	933	14 ... 65,879 5 6
Quarter ending June, 1876				14,726	961	4 ... 65,637 1 0
Total for the year 1876				56,328	3,737	1 ... £248,949 16 0
Showing a quarterly average of				14,082	934	5 ... 62,237 9 0
Corresponding quarter March, 1876				15,964	1002	16 ... 71,543 0 0

The ores sold at the Swansea Ticketings were—

Date.	Standard Prod.	Price.	Per unit.	Tons.	Fine cop.	Amount.
Jan. 2.	2,256	9 8 ... 16 1/2	£12	0 8 ... 14s.	8d.	1,722 ... 282,000 £20,720 18 6
15.	95 15 4 ... 13 1/2	10 1 1 ... 14	7 1/2	1,385	187	14 ... 13,728 2 0
20.	96 7 4 ... 11 11 1/2	8 10 6 ... 14	6	2014	235	8 ... 17,168 18 0
Feb. 15.	98 15 4 ... 14 13 1/2	10 17 10 ... 14	8	2064	305	15 ... 22,486 15 0
27.	98 0 6 ... 11 1/2	8 4 9 ... 14	5	1363	155	1 ... 11,232 17 6
Mar. 13.	91 19 0 ... 20 1/2	14 15 2 ... 14	1 1/2	1,633	347	3 ... 24,544 16 0
Total for the quarter				10,191	1513	1 ... £109,880 7 0
Quarter ending December, 1876				9,779	1375	9 ... 102,068 10 6
Quarter ending September, 1876				11,867	1699	5 ... 117,734 3 0
Quarter ending June, 1876				8,227	1698	10 ... 132,533 10 0
Total for the year 1876				40,064	6195	18 ... £462,219 10 6
Showing a quarterly average of				10,016	1548	19 ... 115,554 17 8
Corresponding quarter March, 1876				4,383	989	4 ... 79,788 10 6

RAILWAY IRON IN AUSTRALASIA.

The intelligence received from the Australasian colonies continue to indicate a large measure of commercial activity, and railways are advancing apace in our antipodean settlements. In the midst of the general depression, it is both encouraging and satisfactory to find that we sent the Australian colonies 6770 tons of railway iron in the first two months of this year, as compared with 6043 tons in the corresponding period of 1876, although the shipments attained the still larger total of 13,439 tons in the corresponding period of 1875. That the Australian demand for our railway material is likely to continue liberal may be inferred from the fact that the single colony of Queensland, with a population of under 180,000, and a territory of 678,000 square miles, has now 298 miles of line open for traffic and 162 miles under construction, besides which it is proposed to construct other new lines to the extent of about 350 miles more, although these extensions have not been finally approved by the Queensland Parliament. The energy which Queensland is displaying in the work of railway construction is, perhaps, rendered all the more remarkable by the fact that thus far the Queensland railways have not been worked with particularly remunerative results. In 1875, for instance, the Queensland railways carried only 137,890 passengers and 50,785 tons of goods, while in South Australia, a colony which has not a much larger population than Queensland, the number of passengers carried by the Government lines in the same year was 1,039,241, the goods movement amounting to 301,549 tons, or nearly 1 1/2 tons per annum of the whole population. But the Queensland authorities see that railways confer indirect benefits upon a colony, even if they are not attended with immediately remunerative results. Similarly sound ideas prevail in the other Australasian colonies, and hence the remarkable vigour with which Australasian railways are now being pushed forward.

As we have before remarked, the work of Australasian colonisation is now advancing with gigantic strides. It was in 1877 that the first Australasian colony—New South Wales—was founded; but it was not until 1824 that the discovery of the value of Merino wool really elevated New South Wales from the degradation inherent in a penal settlement to the dignity associated with a British colony. The establishment of further colonies at the Antipodes—Western Australia in 1829, South Australia in 1836, Victoria and New Zealand shortly after 1840—are all events within the memory of many still living. The astonishing gold discoveries of 1851 really laid the foundations of the Australasian colonies, as they added materially to their wealth and population; and as the pastoral interest of the Australasian colonies has attained an astonishing importance, capital is not now lacking at the Antipodes, and on all sides the Australians are bringing pressure to bear upon their Governments to induce them to undertake the construction of more railways. The progress of New Zealand has been especially rapid during the last 20 years. In 1855 that colony had a population of only 37,192, but in 1860 it had grown to 79,711, in 1865 to 190,607, in 1870 to 248,400, and in 1875 to 275,826. The rate of increase in the first 10 years was not so large as in the second decade, and probably New Zealand will have 1,000,000 inhabitants by 1885. It is wool which has had the largest share in promoting the wonderful progress observable in the material development of New Zealand. Thus in 1855 New Zealand exported only 1,772,344 lbs. of wool, while in 1865 the corresponding exports had risen to 19,180,500 lbs., and in 1875 to 54,401,540 lbs.

It is not surprising, then, to find that New Zealand, in common with the other members of the Antipodean group of settlements, has completed some railways, and has planned out a large additional network. The extent of New Zealand railways in operation in 1873 was 145 miles; in 1874, 209 miles; and in 1875, 542 miles. At the close of 1875 there were also 464 miles more line in course of construction in the Britain of the South.

NATIONAL BOILER INSURANCE COMPANY.—The chief engineer's report for 1876 contains a large amount of information of interest to users of steam. Despite the depression of trade, the number of boilers insured and under inspection has increased, and no inspected boiler has exploded. The most desirable method of setting boilers is described and illustrated, and the system of coating patented by Stone's Boiler Coating Company is advocated. During 1876 there happened 40 steam-boiler explosions which were brought to the chief engineer's knowledge, which is considerably below the average, but the loss of life was unusually large.

MINING IN NEW ZEALAND AND AUSTRALIA.—Amongst the companies registered during the past week is one formed under the title of the Ravenscliff Mining Company (Limited), for the purpose of acquiring some gold mining properties in New Zealand, and a copper property in South Australia. The Memorandum of Association is signed by gentlemen concerned in the direction and management of some of the most successful Australian companies, and whose names are generally looked upon as a guarantee of the bona fides of any undertaking with which they may connect themselves. We understand that the prospectus is to be issued early next week, and have no doubt that the capital of 60,000£. will be speedily subscribed in the present dearth of trustworthy channels for the investment of the large amounts of money now lying idle.

COAL AND IRON IN THE UNITED STATES.—The production of coal in Pennsylvania thus far this year exhibits some increase, as compared with the corresponding period of 1876. The pig-iron trade has not presented any improvement at Philadelphia, and the market is in an unsettled condition. Purchases are made to meet immediate requirements only. Some of the companies state that they are resolved to put their furnaces out of blast rather than to submit to a further reduction in prices. No sales of importance have taken place at Philadelphia in the steel rail market; prices have, however, been firm; \$50 per ton at the mills is the general quotation. Sales of lots of a few hundred tons each are reported almost daily, but buyers of large quantities await concessions. There has been little change to report in iron rails at Philadelphia; business has been quiet, upon the whole; and although some orders are on the market, nothing of importance has been carried through. Some improvement has been noted in the demand for sheet-iron at Philadelphia, although the season has not fully opened. There has been no special change in bar-iron at Philadelphia; the demand has slightly improved, and all the mills have been doing a little more business. The market for all the leading sizes of steel has continued active at Pittsburgh; manufacturers are generally busy, and some of them are unable to keep up with their orders. A decidedly firmer feeling has been noticed at Pittsburgh as regards manufactured iron.

REPORT FROM CORNWALL.

March 29.—This is not a season when one anticipates much liveliness, whether in mining or any other matters of business. Easter always makes that which is lively dull—save in the holiday direction—and that which is dull already duller still. And 1877 is certainly no exception to the rule. It is, in fact, more than could reasonably have been anticipated to learn authoritatively that the hopes entertained of the working of the Great Perran iron lode are really in a fair way of being realised. Mr. Roebeck has never ceased his efforts to develop the mineral wealth of this important district, and though time after time his efforts have seemed doomed to disappointment he has never ceased to strive, having never ceased to retain his faith in the prospects of the locality and in the value of its mineral deposits. It is understood that the gentlemen who are now associated with the undertaking are not only wealthy but thoroughly practical, and the strongest hopes are entertained that even under present conditions a handsome profit will be realised. The management will be in excellent hands.

New Consols appears to be tiding over its difficulties, and we may hope that within a month it will be placed upon a foundation of assured prosperity. In fact, great though the difficulties may have been, the affairs of the mine have now arrived at such a point, and the gigantic experiment made has proved such a practical success, that the men of business and wealth who have hitherto had the mine in hand would be thoroughly stultified themselves if they ceased to give the undertaking their earnest support now that the crucial point has been reached. We trust that before the formal petition again comes on for hearing all will be satisfactorily arranged. Now is the time for all who are interested to pull heartily together.

Few questions of greater practical importance could have been brought before the Mining Institute than that which has occupied the attention of the members this week. The importance of improving the economy and efficiency of stamping arrangements is acknowledged on all hands—in fact, it is every whit as important as any point connected with the dressing of tin. Mr. John Hocking, jun., therefore, deserves the thanks of the mining community for having taken up the subject in so thoroughly practical a spirit. It does not follow that we should agree to all his conclusions. Mr. Hocking holds that the present best form of stamps is the improved gravitation stamp, as illustrated by the new stamps at West Basset, which are driven by a Cornish boiler fitted on the Galloway cone tube principle. These stamps were stated by Mr. Hocking to be stamping at the rate of 61 3 lbs. of tin for each ton of tinstuff, whereas the old stamps used 109 lbs. of coal. Hence the saving is 40 per cent., a very substantial gain indeed, and which shows what the old stamps are capable of. We thoroughly agree with Mr. Hocking on the importance of the extended use of the stone-breaker. He does not look for any particular saving in the breaking by machinery as compared with hand labour, though surely experience points the other way, but he does hold that the stuff when prepared by the breaker is in so much better condition for stamping that the consumption of coal would be reduced to 50 lbs. a ton, or even less. The gravitation stamps did not have all their own way by any means. Mr. Cox gave the experience of pneumatic stamping at Park-o'-Mines to be the consumption of 40 lbs. per ton. But the most important remarks under this head came from Mr. Husband, Capt. Harris, and Mr. Eustace. Mr. Husband starting with stamp heads of 120 lbs. in weight has now got heads weighing 820 lbs., and as the larger the head the less the proportionate expense of stamping, he sees no reason why in time the heads should not be brought up to a ton. There has been ample evidence afforded that the pneumatic stamps, compared with the work they do, are not costly. Capt. Harris stated that 550£. would put up three heads that should crush 20 tons of stuff per day of 10 hours, and the cost of maintenance is really less than that of the old-fashioned plan. It is in this direction we are convinced that the stamp of the future must be sought. Gravitation was all very well when the stamps were worked by water only, but with a costly motor we want not only weight but power.

Man-engines are singularly free from causing accidents, but a fatal one happened last week at Tincroft to a miner named Hocking. At the inquest Henry Ivey said he was ascending to surface on the man-engine at Tincroft Mine on Friday last, and the deceased was one step above him, when, on going from the 160 to the 120, he looked up and saw the deceased holding the handle, and his body swinging over on one side. Witness at once shouted out to the other men to "ring, and hold fast," and several of the men laid hold of the knocker line, which was close by the engine-rod, and rang, but the deceased in the meantime got his head jammed against the solar. How deceased got into the position described witness could not tell. Alfred Hocking said he was going to surface two steps below the deceased, and heard Ivey shout "Ring, and hold fast," and he laid hold of the

knocker line and helped to ring. The engine did not go a stroke after the men rang. At the 120 the deceased fell off on the solar. When he got to him deceased was insensible, and could give no explanation of how he got into the position he was in. The man-engine was in good working order. The deceased was carrying nothing in his hands, and there was no apparent reason why he missed his footing. Dr. Le Neve Foster, the Government Inspector, said he had seen the place where the accident occurred, and could find no fault, except that the toe-step was off. Capt. Martin informed him that the deceased stated that when he was on the step he was seized with a "rambling" in his head. A verdict of "Accidental Death" was returned.

REPORT FROM NORTH AND SOUTH STAFFORDSHIRE.

March 28.—Neither high, medium, nor low class finished iron is in so much demand this week as it was at the date of my last. The works have been going to the utmost extent that the orders would permit to get all specifications out of hand before the close of the week, when the Easter holidays will begin. Prices are being quoted in favour of the market by masters who wish to have some work for their men when the holidays are over. It is necessary to quote prices at which no profit can be got if any work is to be had, yet the disposition to quote such rates is slightly more apparent now than a week ago, notwithstanding the laying off of mills. Pig-iron is being produced in larger quantities than either the foundries or finished ironworks can take it, and there is, therefore, a steady accumulation of stock. For Staffordshire makes the quotations are without much change. A slight weakness is noticeable in minimum qualities for forge uses, but foundry iron is proportionately stronger. Fewer furnaces by two are in blast at Tipton than at the date of my last, because of the failure of Messrs. W. and E. Onions, of the Park Lane Furnaces. Quite as much has been done in the week at the collieries, but there is reason to conclude that after Easter the prevailing quietude will be more marked. Some colliery owners are hoping that terms will be practicable for increasing the stint before the expiration of the six months within which no changes in wages can be made under the terms of the arbitration agreement. But by the Union the men are being encouraged to resist any such arrangement.

The Warwickshire Mineowners' Association have given their men notice for a drop of 10 per cent., and invite them to a conference to discuss the matter. The men are about holding a meeting to decide what course they shall pursue.

Little movement is manifest in the local share market as regards the property of coal and iron concerns. The 20/- fully paid shares of the Alldridge Colliery sold since my last at 7/- premium; buyers are offering 20/- for the 10/- fully-paid shares of the Sandwell Park Colliery; holders of West Cannock Colliery shares are willing to part with them at 5 and 2 1/2 discount respectively, and 2/- discount will still secure the 20/- (4/- paid) shares of the Cannock and Huntington, and the 20/- (12/- paid) shares of the Hamstead Colliery. The 5 per cent. preference shares of the Patent Shaft and Axletree Company have changed hands at 10/- 5s.; and the 10/- shares of Messrs. J. Bagnall and Sons at 3/- 10s. Encouraged, no doubt, by the late favourable report, buyers are offering 15/- for the 10/- shares of the Muntz Metal Company, but there are no sellers.

A movement is going on in the nut and bolt trade by which the masters hope to gain some slight reduction in wages to help them to contend against the present bad trade. A conference between representative masters and men has been held in consequence of the masters having resolved to reduce the price agreed in 1872 to be paid, and the men have consented to receive a revised list of prices for consideration. It is, however, unlikely that the men will submit to any reduction, at any rate not without a struggle. The Safe Trade is generally improving, and manufacturers who have reduced their prices this year are not much in want of orders. A safe of no mean pretensions has just been dispatched from this district to Battle Abbey direct, to the order of the Duchess of Cleveland. Her Grace designs it for the custody of her jewels, the recent robbery from Battle Abbey having led to the purchase. The safe is 2 ft. 9 in. high, and over 2 ft. deep and wide, is drill, wedge, and fire proof, and cannot be picked. After her grace's own design, it has been fitted up by the maker (Mr. George Price, Cleveland Works, Wolverhampton) with five drawers, in which the jewel cases will be stored. The body plates are 4 to 5 in. thick; the door, 2 in., is case-hardened, by which it is proof against the drill, and the wedge is made harmless by the formidable rings of boiler-plate iron which are shrunk on around the front and back.

In North Staffordshire a revival in the pottery trade has benefited the coal industry, still not half the coal is being mined that could be brought up. Domestic coal ranges from 10s. to 12s. 6d. at the pits. The quantity of ironstone sent out of the district is falling off. Pig-iron is without improvement, prices are weak, and sales not large or frequent. Most of the finished ironworks are able to make 8 and here and there 10 turns per week, but new orders are difficult to get in most departments.

REPORT FROM THE NORTH OF ENGLAND.

March 28.—The state of the Durham Coal Trade continues so depressed that the owners have been compelled to demand further reductions of wages from cokemen and enginemen employed about the collieries. These reductions are now under consideration, and whether they will be submitted, as others have heretofore, to arbitration, or whether they will be awarded subject to the provisions of the sliding scale that is now applied to the wages of underground

has produced such wonderful results as to have shipped last year over 20,000 tons of copper ore, with every prospect of greatly exceeding that quantity in this year's shipment. In company with Mr. Ellerhausen he visited Bot's Cove last season, and was amazed at the wonderful developments achieved in so short a period. The name of Ellershausen with that of Bennett will always live among those of the great benefactors of Newfoundland. Many other mines are now being opened in Notre Dame Bay, as well as other localities, and the future prospects of this country are a great mining country, but fair to rival those of any other in the world. Besides copper and nickel there is abundant evidence of the existence of other large and valuable mineral deposits all over the island, such as iron, tin, lead, and gypsum. About the regions of St. George's Bay, on the west coast of the island, he was assured by scientific gentlemen who have examined it that coal equal to the best North Sydney exists in large and workable deposits. It would seem as if nature had placed them there on purpose to induce the construction of a railway across the country, as well to supply the locomotive and the steamship as the manufacturing and domestic wants of St. John's, and indeed of the whole island.

With regard to the facilities for obtaining the necessities of life, which are essential for the profitable development of mining as of other classes of enterprise, His Excellency Sir John H. Glover remarks that his recent visit to Notre Dame Bay enabled him to realise its geographical importance. The comparative absence of fog, combined with the existence of numerous islands at the mouths of the rivers and fords, tend to produce a modification of climate, favourably affecting those fertile lands in the neighbourhood, and fairly lead to the conclusion that the large and increasing mining population may be amply supplied with the necessities of life by agricultural settlers in these localities. He suggested the probability that in three or four years the exports from the bay will represent an annual value of 1,000,000/- sterling, or nearly one-third of the amount of the whole of the exports of Newfoundland and Labrador, and that the settled population will in less than a decade amount to from five to seven persons for every miner engaged in the several mines. Judicious, and at the same time spirited, enterprise will, he considers, cause the bay to become a great emporium of trade, and the maritime key to thriving settlements on a line of road through the heart of the country to the Bay of Islands and St. George's Bay on the West Coast. Communication with the capital by road and telegraph will shortly be effected, so that the future is, indeed, a brilliant one.

SILVER-LEAD MINE.

THE ADVERTISER has a VALUABLE SETT that can be proved cheaply by ass't: lode now in adit end that will pay well, and the lode is running into a high hill. The district is one of the best in Cornwall for mineral, and two tons silver lead now at surface. There is also a large copper lode in the sett. Should be GLAD to MEET with GENTLEMAN to ASSIST in RAISING a COMPANY.

Reports and full particulars from "Engineer," 28, Fleet-street, London, E.C.

LEAD MINE WANTED.

THE ADVERTISER is READY to SPEND MONEY in OPENING OUT or DEVELOPING any promising LEAD or SILVER LEAD MINE, and will share the proceeds or make any other arrangement that may be satisfactory with anyone who has such a sett, or can introduce anything really good.

Address, "G. W." MINING JOURNAL Office, 26, Fleet street, London, E.C.

PARTNERSHIP, OR INVESTMENT IN AN ESTABLISHED MANUFACTURE.

WANTED, a PARTNER, with £2500 to £3000, in an ESTABLISHED MANUFACTURING CONCERN. Products of a high class, and very profitable; or a PERSON who would INVEST THE ABOVE SUM for a term, and SHARE in the PROFITS. Principals or their solicitors only desired.

Address, "Co'or," Messrs. Yates, Son, and Stananought, Solicitors, 10, Water-street, Liverpool.

WEST TRESAVEAN MINE, GWENNAP.

WANTED, in the above Mine, TWO HUNDRED or FIVE HUNDRED SHARES immediately.

Sellers please state number and lowest cash price to "A. B." Post Office, Redruth, Cornwall.

WANTED, a GOOD SECONDHAND STEAM CRANE of the SMALLEST SIZE.

State price, and address "J. H." 4, Cambridge-place, Bath.

A N ASSOCIATION has been FORMED for the ERECTION in NORTH GERMANY of WORKS for the EXTRACTION OF COPPER from SPANISH CUPRIFEROUS IRON PYRITES.

Civil engineers or chemists having the requisite practical experience, and able to prepare the necessary plans, estimates of cost of construction, and of working expenses and income, are invited to apply, in writing, to "K. E. A." care of Mr. Street, 30, Cornhill, E.C.

A CIVIL and MINING ENGINEER, of good practical experience, undertakes to MAKE SURVEYS, DESIGNS, PLANS, TRACINGS, &c., and SUPERINTEND WORKS in connection with the above profession. Terms moderate.

Testimonials and full particulars on application at 14, Burton road, Clapton Park, London, E. Documents translated with the greatest accuracy from the French and German into English, and vice versa.

THE FRIENDS of a YOUTH, aged 16, are DESIROUS of QUALIFYING HIM for an ASSAYER and ANALYST.

State terms to "E. W." 24, Harold-street, Camberwell.

T H E V A N M I N I N G C O M P A N Y (LIMITEDE).

Notice is hereby given, that the Directors have this day DECLARED A QUARTERLY DIVIDEND of £12,000, being SIXTEEN SHILLINGS PER SHARE on the 15,000 shares of the company, PAYABLE, free of income tax, on and after the 10th day of April next.

The Transfer books will be closed from the 4th to the 11th proximo, both days inclusive.

By order, W. J. LAVINGTON, Secretary.

144, Austinfriars, London, March 31, 1877.

VIRNEBERG COPPER MINING COMPANY, LIMITED.

Registered under the Companies Acts, 1862 and 1867, whereby the liability of shareholders is limited to the amount of their shares.

Capital £100,000, in 50,000 shares of £2 each.

Payable—5s. on application, 5s. on allotment, balance as required.

Call not to exceed 10s., and at intervals of not less than 2 months.

DIRECTORS.

Mr. Alderman HADLEY, Sheriff of London and Middlesex—CHAIRMAN.

MR. SOUTHGATE, Esq. (Chairman of the Roman Gravels Mining Co., Limited), King's Bench Walk, Temple, London.

THOMAS DICKINS, Esq., J.P., Higher Broughton, Manchester.

WILLIAM KEITH, Jun., Esq., King Street, Aberdeen.

ROBERT JOHNSON, Esq., Park Villa, Romford, Essex; and Gracechurch-street, London.

EDWARD HILTON, Esq. (Director of the Grogginion and Wye Valley Mining Companies, Limited), Radfield, Clapham Park.

BANKERS.

The LONDON AND SOUTH-WESTERN BANK (Limited), Fenchurch-street, London.

BROKER.

JOHN GIBBS, Esq., 51, Threadneedle-street, and Stock Exchange, London.

SOLICITORS.

A. D. SMITH, Esq., 31, Great James street, Bedford-row, London.

CHARLES KEARSLY, Esq., 26, Brazenose street, Manchester.

SECRETARY—THOMAS R. CLARKE.

OFFICES—86, LONDON WALL, LONDON, E.C.

NOTICE IS HEREBY GIVEN, that the LIST OF APPLICATIONS for SHARES in the above-named company will be CLOSED on SATURDAY, the 7th APRIL proximo.

London, March 23rd, 1877.

By Order.

M E S S R S . T H O R N Y C R O F T A N D C O . FINANCIAL AGENTS AND SHARE BROKERS.

51, SOUTH JOHN STREET, LIVERPOOL.

M E S S R S . K E E N E A N D L A M B E R T , STOCK AND SHARE BROKERS.

METROPOLITAN BUILDINGS, 69, QUEEN VICTORIA STREET, E.C.

Bankers: London and Westminster Bank, Lothbury.

In the Court of the Vice-Warden of the Stannaries.
Stannaries of Cornwall.

IN the MATTER of the COMPANIES ACT, 1862, and of the WHEAL GRAMBLER MINING COMPANY.—Notice is hereby given, that a PETITION for the WINDING-UP of the above named company by the Court was, on the 23rd day of March instant, presented to the Vice-Warden of the Stannaries, by Robert Tweedy, Sir Frederick Martin Williams, Baronet, M.P., William Tweedy, Robert Milford Tweedy, and Charles Tweedy, carrying on business as bankers at Redruth and elsewhere, in the county of Cornwall, under the style or firm of "Tweedy, Williams, and Co.", claiming to be creditors of the said company, and that the said petition is directed to be heard before the Vice-Warden at the Princes Hall, Truro, in the county of Cornwall, on Thursday, the 12th day of April next, at Twelve o'clock at noon.

Any contributory or creditor of the company may appear at the hearing and oppose the same, provided he has given at least two clear days' notice to the petitioners, their solicitor, or his agents of his intention to do so, such notice to be forthwith forwarded to P. P. SMITH, Esq., Secretary of the Vice-Warden, Truro.

Every such contributory or creditor is entitled to a copy of the petition and affidavit verifying the same from the petitioners, their solicitor, or his agents, within 24 hours after requiring the same, on payment of the regulated charge per folio.

Affidavits intended to be used at the hearing, in opposition to the petition, must be filed at the Registrar's Office, Truro, on or before the 10th day of April next, and notice thereof must at the same time be given to the petitioners, their solicitor, or his agents.

ROBERT MACLEAN'S PAUL, Truro, Cornwall
(Solicitors for the petitioners).

GREGORY, ROWCLIFFES, AND RAWLE, 1, Bedford-row, London
(Agents of the said Solicitor).

Dated Truro, the 26th day of March, 1877.

THE BIRCHGROVE GRAIGOLA STEAM COAL COLLIERIES, GLAMORGANSHIRE.

M E S S R S . N O R T O N , T R I S T , W A T N E Y , A N D C O . WILL OFFER FOR SALE, at the Mart, London, on Friday, May 4th, at Two o'clock precisely, in One Lot, very valuable MINERAL PROPERTY, known as THE BIRCHGROVE GRAIGOLA STEAM COAL COLLIERIES,

Together with the FIXED MACHINERY, STEAM ENGINES, PLANT, and ROLLING STOCK, situated in the Swansea Valley, in the parish of Llansamlet, together with the shipping wharf, office, store-house, lodge, and stable, situated at the New Cut, in the hamlet of Saint Thomas, Swansea, in the county of Glamorgan, in the midst of iron, copper, tin-plate, and patent fuel works and steel manufacturers, and about five miles from the seaport town of Swansea, and directly connected therewith by the Swansea Vale Railway, branching into both the colliery yards.

Particulars, when ready, may be had of Messrs. FRANK RICHARDSON and SADLER, Solicitors, 28, Golden-square; WALTER WEBB, Esq., Solicitor, 23, Queen Victoria-street, E.C.; Meers, STRICK and BELLINGHAM, Solicitors, Swansea; and of the Auctioneers, 62, Old Broad-street, London, E.C.

MINING SETT AND MACHINERY FOR SALE, CALSTOCK, CORNWALL.

TO BE SOLD, pursuant to an Order of the Chancery Division of the High Court of Justice, made in an action Started v. the Duchy Great Consols (Limited), and others, with the approbation of the Vice-Chancellor Sir JAMES BACON, by MR. JOHN CADDOCK CHOWEN, of the Firm of Ward and Chowen, the person appointed by the said Judge, at the Count House on the Mine of the said defendant company, at Litchley, in the parish of Calstock, in the county of Cornwall, on Monday, the 9th day of April, 1877, at Two o'clock in the afternoon, in One Lot as a going concern, the MINE SETTS, MACHINERY, MATERIALS, PLANT, and EFFECTS, known as the

DUCHY GREAT CONSOLS MINE.

Situate at LATCHLEY, in the parish of CALSTOCK, CORNWALL, and held on leases of twenty-one years from the 24th day of November, 1871, and twenty years from the 6th day of December, 1872.

Particulars and conditions of sale may be had, gratis, of Messrs. WARD and CHOWEN, of Burnville, Bridestow, Devon; or of MR. JAMES RICHADS, TAMAR View, Tavistock; or of MR. WALTER WEBB, of No. 23, Queen Victoria-street, in the City of London, Solicitor; and at the place of sale.

Dated March 2, 1877.

PLUMBAGO MINE AND SLATE QUARRIES.

TO BE SOLD, BY PRIVATE TREATY, ONE-QUARTER SHARE in the BORROWDALE PLUMBAGO MINES, and in HINISTER (GREEN) SLATE QUARRIES, near KESWICK, in the county of CUMBERLAND, and in the PLANT and MACHINERY belonging thereto.

Particulars as to the present state and extent of the mines and quarries, and price required, may be obtained from MR. N. PEARSON, Accountant, Ulverston, Lancashire.

To BE SOLD, BY PRIVATE CONTRACT, the CLAY LANE IRONWORKS, with six furnaces, and the SOUTH BANK IRONWORKS, with eight furnaces, both at Middlesborough, together with the VALUABLE IRONSTONE and COAL LEASES held in connection therewith. The above are in operation, and part of the Estate of Messrs. Thomas Vaughan and Co.

Apply to EDWD. WILLIAMS, Esq., Cleveland Lodge, Middlesborough.

TO MINE AND QUARRY OWNERS.

TO BE SOLD, SEVERAL ACRES of FREEHOLD LAND, containing an IRON MINE; and a SETTS QUARRY, which produces a stone of excellent quality.

For further particulars, apply to Messrs. BREESE and Co., Solicitors, Pwllheli, Carnarvonshire.

SULPHATE OF BARYTES FOR SALE.—Fine powdered, beautifully white; also in the Rock or Crude State, free from Lime and Metallic Oxide.

Samples on application to—

RUTHWAITE BARYTES MINING COMPANY, WHITEHAVEN.

Nov. 17, 1875.

MINING PROPERTIES FOR SALE.—SEVERAL bona fide BROWN HEMATITE, MANGANIFEROUS IRON, and SILVER LEAD MINES, situated in the Province of MURCIA, SPAIN, TO BE SOLD.

Apply to Sr. D. Jose BOWON, Del Comercio, Cartagena.

LLAN GAN LEAD MINING COMPANY (LIMITED).

FOR SALE, A FEW SHARES in this HIGHLY SUCCESSFUL COMPANY, £2 fully paid. See report in the Supplement to the *Mining Journal* of March 24.

Apply, with offer, to Messrs. BOLTON, SON, and CO., 26, Great St. Helen's, Bishopsgate-street, London, E.C.

APPLEBY IRONWORKS, FRODINGHAM.

FOR SALE, a PRACTICALLY NEW BRICK-MAKING PLANT, only having been used eighteen months in the erection of these works, consisting of TWO of SCHOLEFIELD'S PATENT SEMI-DRY BRICK PRESSES, complete, with gearing and 9 feet pin and rollers; also, PAIR of 3-feet RIBB ROLLERS, all in first-rate working order; with or without a first-class 25-horse power ROBEY MINING ENGINE, new eighteen months ago, and in first-class condition.

Apply to the APPLEBY IRON COMPANY (Limited), Doncaster.

FOR SALE, or LEASE, GALVANISED IRON and STONE SHEDS, in SOUTH DOCK, SWANSEA, alongside Wharf and Rail, and suitable for Warehousing Metals, Minerals, Export, and other fibres, &c.

To view, apply to Mr. D. WILLIAMS, 36, Argyle-street, Swansea. For terms, to "A. B." Messrs. Pottle and Son, Royal Exchange Buildings, London, E.C.

FOR SALE, a 18-horse power PORTABLE STEAM ENGINE, with link motion reversing gear, ready for delivery.

A 25-horse power PORTABLE.

An 18-horse power VERTICAL STEAM ENGINE, with link motion reversing gear, also gear to wind and pump.

A 9 ft. PAN MORTAR MILL, VERTICAL ENGINE, and BOILER.

Apply to—
BARROWS AND STEWART, ENGINEERS, BANBURY.

FOR SALE, at NEW PEMBROKE MINE, near PAR STATION, CORNWALL.

An excellent 50 in. cylinder PUMPING ENGINE, 12 ft. stroke in cylinder and 10 ft. in shaft, with cast-iron balance bob, and FOUR 12 ton BOILERS, in good condition.

ONE 25 in. DRAWING ENGINE, and TWO BOILERS.

ONE 20 in. STAMPING ENGINE, with three iron stamps' axles, carrying 3 heads, and TWO BOILERS.

Also, OTHER GOOD MINE MATERIALS.

Apply to—
MR. JOHN POLKINGHORNE, PAR OFFICE, PAR STATION.

ON SALE:—

ONE 70 in. cylinder single acting PUMPING ENGINE.
ONE 30 in. ditto ditto ditto

ONE 22 in. ditto ditto ditto

ONE 18 nominal h. r. s. power PORTABLE ENGINE.

Several CORNISH BOILERS, PITWORK, STRAPPING PLATES, CAPS, &c., and various other spare MINE MATERIAL. Also, one large BALANCE BOB.

Apply to—

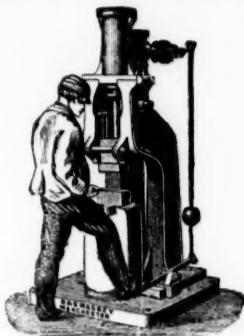
WILLIAM TREGAY, REDRUTH, CORNWALL.

B. & S. MASSEY, OPENSHAW, MANCHESTER.

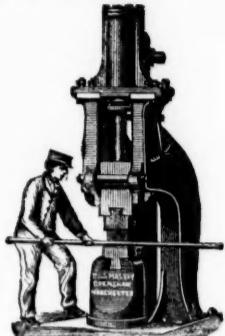
Prize Medals—Paris, 1867; Hayre, 1868; Highland Society, 1870; Liverpool, 1871; Moscow, 1872; Vienna, 1873; Scientific Industry Society, 1875; Leeds, 1875; Paris, 1875; Mancheser and Liverpool Society, 1876; U.S. Centennial, Philadelphia, 1876.

PATENTEES AND MAKERS OF DOUBLE AND SINGLE-ACTING STEAM HAMMERS

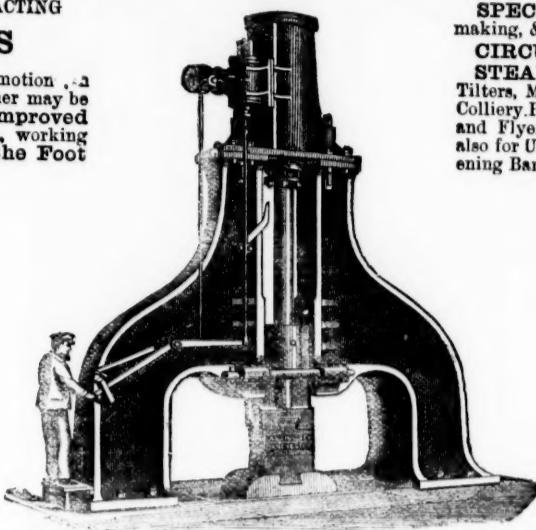
Of all sizes, from $\frac{1}{2}$ cwt. to 20 tons, with self-acting or hand motion, either case giving a perfectly DEAD BLOW, while the former may be worked by hand when desired. Large Hammers, with Improved Framing, in Cast or Wrought Iron. Small Hammers, working up to 500 blows per minute, in some cases being worked by the Foot of the Smith, and not requiring any separate Driver.



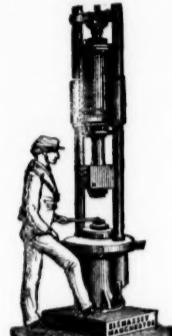
Small Hammer with Foot Motion.



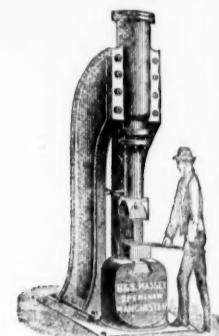
General Smithy Hammer.



Steam Hammer for Heavy Forging.



Special Steam Stamp.



General Smithy Hammer.

From 60 to 100 Steam Hammers and Steam Stamps may usually be seen in construction at the Works.

"Champion" Rock Borer, For Tunnels, Mines, Quarries, HARBOUR WORKS, CUTTING BLOCKS OF GRANITE, &c.



STANDS POSITIVELY UNRIVALLED FOR

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| 1.—EFFICIENCY. | 5.—ADJUSTABILITY. |
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| 3.—SIMPLICITY. | 7.—COMPACTNESS. |
| 4.—DURABILITY. | 8.—STRENGTH. |

Intending purchasers can satisfy themselves by personally inspecting "CHAMPION" Rock Borers at work in London, or where they are in actual operation, that the advantages claimed are not overestimated.

AIR COMPRESSING MACHINERY

of the SIMPLEST and BEST CONSTRUCTION.

COMBINED AIR-COMPRESSORS AND

WATER-PRESSURE ENGINES

Giving most excellent results.

ULLATHORNE AND CO., Mechanical and Consulting Engineers, 63, QUEEN VICTORIA STREET, LONDON, E.C.

MAPS OF THE MINES, AND OF UTAH TERRITORY.

FROISETH'S NEW AND REVISED MAP FOR 1875.—Size 40 by 56 inches, scale 8 miles to the inch. Handsomely engraved, coloured in counties, showing the Towns, Settlements, Rivers, Lakes, Railroads, Mining Districts, &c., throughout the Territory, and all the Government Surveys to date. Mounted on cloth, £2; half-mounted, £1 12s.; pocket form, £1.

Also, GENERAL MINING MAP OF UTAH, showing twenty-eight of the principal Mining Districts adjacent to Salt Lake City, and location of the most prominent mines. Price, pocket form, 6s.

Also, NEW MAP OF LITTLE AND BIG COTTONWOOD MINING DISTRICTS, showing the location of over Four Hundred Mines and Tunnel Sites, together with the Mines Surveyed for United States Patent. Price, sheets, 6s.; pocket form, 8s.

For sale, and supplied by—
TRUBNER AND CO., 57 and 59, Ludgate Hill, London; or
B. A. M. FROISETH, Salt Lake City, Utah, U.S.

ACCIDENTS BY FLOOD AND FIELD.

ACCIDENTS OF ALL KINDS
May be provided against by Policy of the

RAILWAY PASSENGERS' ASSURANCE COMPANY.

THE OLDEST AND LARGEST ACCIDENTAL ASSURANCE COMPANY.

Hon. A. KINNAIRD, M.P., Chairman.

Subscribed Capital, £1,000,000. Annual Income, £265,000.

£1,120,000 have been paid as compensation.

A fixed sum in case of death by accident, and a weekly allowance in the event of injury, may be secured at moderate premiums.

Bonus allowed to Insurers of five years' standing.

Apply to the Clerks at the Railway Stations, the Local Agents, or—

64, CORNHILL, LONDON.

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SPECIAL STEAM STAMPS, for Forging, Stamping, Punching, &c., making, &c.

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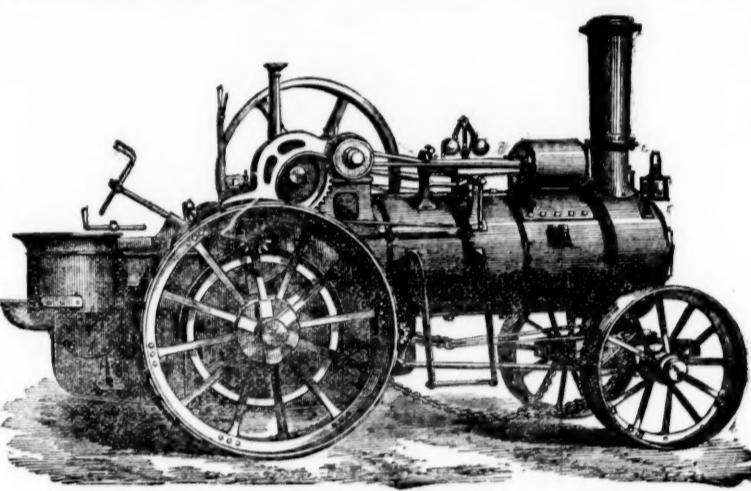
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This alloy has very great tensile strength ... 140 "

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No. XI., special phosphor-bronze bearing metal, wearing five times as long as gun metal 112 "

The prices of castings vary according to the pattern, the quantity required, and the alloy used.

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This wheel (which is now largely in use in England, Scotland, and Ireland) is the only one yet invented which gives proportionate power from both large and small quantities of water. It can be made for using a large winter supply, and yet work with equal efficiency through all variations of quantity down to a fifth, or even less if required. It is easily coupled to a steam-engine, and, in this way, always assists it by whatever amount of power the water is capable of giving, and, therefore, saves so much fuel.

This Turbine is applicable to all heights of fall. It works immersed in the tall-water, so that no part of the fall is lost, and the motion of the wheel is not affected by floods or back-water.

References to places where it is at work will be given on application to the makers—

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They have never been known to fail in affording immediate relief.

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BRITISH DIVIDEND MINES.

Shares.	Mines.	Paid.	Last wk.	Clos. pr.	Total divs.	Per sh.	Last wd.	
1500 Alderley Edge, c, Cheshire*	10 0 0	—	—	—	12 11 8	0 8 0	Jan. 1876	
15000 Balmytheer, t, Wendoron (4000 to sh.)	1 0 0	—	—	—	0 2 0	0 2 0	Nov. 1876	
20000 Barnbyde, c, t, mnn., Devon*	1 0 0	—	13%	13% 15%	0 2 0	0 2 0	June 1872	
40000 Blackfallow, t, c, St. Just*	119 5 0	30	25 30	619 15 0	8 0	0 Aug. 1871		
40000 Blawith, t, c, Penkridge*	1 18 0	—	2% 2% 2%	3 18 0	0 2 0	Nov. 1876		
20000 Bly Alyn*, t, Denbigh. (10, sh.)	8 0 0	8 5%	8 8 2%	0 7 0	0 7 0	Jan. 1877		
5248 Cargill, s, Newlyn	6 6 0	—	4 4 4%	4 18 0	12 6	Oct. 1871		
6400 Cashwell, t, Cumberland*	2 10 0	—	2% 2%	1 9 6	0 2 0	Aug. 1876		
1000 Carn Brea, c, t, Illogan*	6 0 0	—	37	34 36	0 0 0	1 0 0	Feb. 1878	
2450 Cook's Kitchen, t, Illogan*	25 9 9	3%	3% 4%	118 10 0	0 12 0	May 1872		
12240 Devon Gt. Consols, c, Tavistock*	1 0 0	—	4	3% 4%	111 1 3	0 7 6	Jan. 1877	
4296 Dorefoot, t, c, Camborne	10 14 10	37	34 36	0 10 0	0 10 0	Feb. 1871		
8000 East Black Craig*, t, Scotland	5 0 0	—	64% 54%	14 19 0	0 2 0	Oct. 1872		
6144 East Cadron, c, St. Cleer	2 14 6	1	7% 1%	235 10 0	1 0 0	Aug. 1876		
300 East Darren, t, Cardiganshire	32 0 0	—	—	—	—	—		
5400 East Pool, t, c, Illogan	9 9 9	10 11	—	15 0 0	0 2 0	Mar. 1877		
2500 Foxdale, t, Isle of Man*	25 0 0	—	—	82 5 0	0 10 0	Feb. 1876		
40000 Glasgow Carr, c [30,000 £1 p. 10,000 15s. p.]	1 4	1 14	—	0 12 4	0 6 0	Apr. 1876		
15000 Great Dylly*, t, Montgomeryshire	4 0 0	—	3 4	0 2 6	0 2 6	Apr. 1876		
15000 Great Laxey, t, Isle of Man*	4 0 0	—	21	20 21	21 13 0	0 10 0	Apr. 1877	
615 Great Ratlack, t, bl, Perranzabuloe	5 18 6	—	1% 1%	0 1 0	0 1 6	May 1877		
25000 Great West Vap., t, Cardigan*	2 0 0	—	3%	0 2 0	0 1 0	Aug. 1874		
6400 Green Hurst, t, Durham*	0 6 0	—	3	2% 2%	1 12 0	0 4 0	Oct. 1874	
20000 Grongwinion, t, Cardigan*	2 0 0	—	5% 4%	0 12 0	0 4 0	Feb. 1876		
6830 Gunnislake (Clitters), t, c	5 5 0	—	2% 2%	0 13 9	0 1 0	Oct. 1876		
1024 Herrod-foot, t, near Liskeard	8 10 0	—	3% 3%	62 5 0	0 15 0	Aug. 1872		
18000 Hindon Down, c, Calstock*	1 0 0	—	5%	0 1 0	0 1 0	Nov. 1876		
6000 Holmboe, a, c, s, Callington*	1 0 0	—	13%	0 1 0	0 6 0	Mar. 1877		
25000 Kilanion, t, Fife	1 0 0	—	—	0 3 11% 0	0 8 0	Mar. 1877		
40000 Lislburne, t, Carmarthenshire	18 15 0	80	70 80	580 10 0	1 0 0	Mar. 1877		
14000 Llanidloes*, t, Montgomery	3 0 0	—	2 2	0 9 0	0 6 0	Nov. 1876		
6120 Lovell, t, Wendoron	0 18 0	—	—	0 17 6	0 1 6	Jan. 1874		
9000 Marc Valley, c, Linkinhorne	5 0 6	—	1% 1%	7 15 0	0 0 0	Feb. 1876		
11000 Melindur Valley, t, Cardigan*	3 0 0	—	1% 1%	0 7 2	0 3 7	Jan. 1876		
9000 Minera Mining Co., t, Wrexham*	5 0 0	—	21	19 21	68 18 2	0 8 0	Feb. 1877	
20000 Mining Co. of Ireland, cl, c, l*	7 0 0	—	5%	23 11 8	0 3 8	Jan. 1876		
512 North Busy, c, Chacewater	3 9 6	—	8% 8%	0 10 0	0 10 0	Dec. 1875		
10 59 North Heddle, t, Wales	2 10 0	—	—	1 7 6	0 2 8	Dec. 1875		
2000 North Levant, t, c, St. Just*	12 2 0	—	—	4 13 0	0 12 0	Sept. 1873		
27855 Old Treburret, t, ordinary shares	1 0 0	—	—	0 0 0	0 0 0	0 0 0		
9258 Old Treburret, t, (10 per cent. pref.)	0 10 0	—	35 35	0 1 4 0	0 6 0	July 1874		
8000 Penhalls, t, St. Agnes	3 0 0	—	2% 2%	3 13 6	0 2 0	July 1876		
4793 Penstruhul, t, c, Gwennap	2 0 0	—	3% 3%	2 2 8	0 0 8	Nov. 1875		
12000 Phoenix & W. Phoenix, t, c, Link*	8 4 9	—	4% 4%	2 9 6	0 4 0	Nov. 1875		
12000 Prince Patrick, t, c, Holywell	1 0 0	—	2% 1% 2%	0 14 0	0 1 3	Jan. 1876		
1120 Providence, t, Lelant*	18 6 7	—	—	104 12 6	0 10 0	S-pt. 1876		
12000 Roman Gravels, t, Salop*	3 10 0	—	13%	12% 13	7 1 6	0 8 0	Mar. 1877	
512 South Cadron, t, St. Cleer	1 5 0	—	125	110 130	734 0 0	3 0 0	Jan. 1877	
812 South Condorow, t, c, Camborne*	6 5 6	—	7% 7%	2 8 0	0 0 0	4 0 0	Jan. 1877	
12000 St. Harmon*, t, Montgom.	3 0 0	—	3% 3%	0 3 0	0 3 0	Jan. 1877		
10 000 St. rr. Patrick, t, (5000 sh. issued)	1 0 0	—	—	0 7 0	0 1 0	Oct. 1875		
12000 Tankerville, t, Sailes	6 0 0	—	9	8% 8%	4 17 0	0 5 0	Dec. 1875	
6000 Timcroft, t, Pool, Illogan	9 0 0	—	19% 18%	55 0 0	0 10 0	Jan. 1877		
15000 Van, t, Llanidloes*	4 5 0	—	—	35 37	0 19 6	0 18 0	Dec. 1875	
8600 W. Cleveland, t, Perranzabuloe	12 10 0	—	13	11 13	1 19 0	0 4 0	July 1874	
1783 West Poldice, St. Day	10 0 0	—	—	18 15 0	0 1 0	Feb. 1877		
512 West Tolgus, c, Redruth	95 10 0	—	62%	60 62	18 15 0	1 0 0	Feb. 1877	
2045 West Wheal Frances, t, Illogan	25 13 9	—	3% 3%	3 12 8	0 8 0	Oct. 1872		
12000 West Wye Valley*, t, Montgomery	3 0 0	—	3% 2% 3%	0 6 0	0 3 0	Nov. 1876		
512 Wheal Bassett, t, Illogan*	17 2 6	—	4 6	688 10 0	1 10 0	Aug. 1876		
1024 Wheal Eliza Consols, t, St. Austell	20 0 0	—	—	10 0 0	0 4 0	Feb. 1876		
2045 Wheal Jane, t, Kent	2 13 10	—	—	11 15 4	8 5 0	0 5 0	July 1876	
4295 Wheal Kitty, t, St. Agnes	5 4 6	—	2% 2%	11 19 6	0 2 8	Dec. 1874		
80 Wheal Owles, t, St. Just	86 5 0	—	140	130 140	522 10 0	4 0 0	Aug. 1875	
6000 Wheal Prussia, t, Redruth	2 0 0	—	4% 4%	0 3 0	0 2 0	Dec. 1875		
25000 Wicklow, t, sul, t, Wicklow	2 10 0	—	2% 1%	52 9 0	0 0 0	2 8 0	Mar. 1872	
31000 Wye Valley, t, Montgomery	3 0 0	—	5% 4% 4%	0 10 0	0 8 0	6-Oct. 1876		

FOREIGN DIVIDEND MINES.

Shares.	Mines.	Paid.	Last Pr.	Clos. Pr.	Last Call.
85500 Alamillos, t, Spain*	2 0 0	—	2	1% 1%	1 17 3
80000 Almada and Trito Consol., t*	1 0 0	—	3%	0 6 2	0 1 0
20000 Australian, c, South Australia*	7 7 8	—	2% 2%	0 18 0	0 2 6
10000 Battle Mountain, c, (240 part pd.)	5 0 0	—	—	0 10 0	0 10 0
15000 Birdseye Creek, g, California*	4 0 0	—	3% 3%	0 14 0	2 6 June
12320 Burrara, c, So. Australia	3 0 0	—	—	70 0 0	0 10 0
20000 Caps Copper Mining, t, So. Africa*	7 0 0	—	42	39 41	27 15 0
40000 Cedar Creek, g, California*	8 0 0	—	—	0 5 0	0 2 6
15000 Chilco, g, Utah	10 0 0	—	4% 4%	2 8 0	0 4 0
21000 Colorado Terrible, t, Colorado**	8 0 0	—	1% 1%	13 1 2	0 13 0
10000 Copiapo, c, Chile (20 shares)	15 15 0	—	—	7 8 5	0 2 6
6000 Don Pedro North del Rey*	0 18 0	—	3% 3%	2 9 0	0 2 0
23500 Eberhardt and Aurora, t, Nevada*	10 0 0	—	9%	8 9 0	0 3 0
6000 Emma, g, Utah	20 0 0	—	3%	12 12 0	0 6 0
70000 English and Australian, cl 5. Aus.	2 10 0	—	1% 1%	2 18 0	0 2 0
20000 Fentone, t, Spain*	2 0 0	—	7%	4 2 0	0 5 0
55000 Fratino & Bolivia, g, New Gran*	2 0 0	—	1% 1%	0 1 0	0 0 0
6000 Gold Kun, hyd.	1 0 0	—	—	0 2 4	0 0 0
88000 Kapunda Mining Co. Australia?	1 3 0	—	—	0 2 4	0 6 0
20000 Last Chance, t, Utah	5 0 0	—	3% 3%	0 14 0	0 2 0
15000 Linares, t, Spain*	3 0 0	—	7% 6%	16 17 2	0 9 0
65000 London and California, t?	2 0 0	—	—	0 1 0	0 1 0
7537 Lusitanian, Portugal? (55 shares)	8 10 0	—	—	1 11 6	0 6 0
5000 Mammoth Copperpools of Utah, c, t	10 0 0	—	—	0	